# LANDOLT-BÖRNSTEIN

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Group III: Crystal and Solid State Physics

Volume 3
Ferro- and Antiferroelectric Substances

by Toshio Mitsui and

R. Abe · Y. Furuhata · K. Gesi · T. Ikeda · K. Kawabe Y. Makita · M. Marutake · E. Nakamura · S. Nomura E. Sawaguchi · Y. Shiozaki · I. Tatsuzaki · K. Toyoda

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#### II Data

### Oxides

### 1 Perovskite-type oxides

### 1A Simple perovskite-type oxides

### Nr. 1A-1 NaNbO<sub>3</sub>, Sodium niobate

Nr. 1	A-1 NaNbO	1.1 NaNbO <sub>3</sub> , Sodium modate  It was reported by Matthias et al. in 1951 that NaNbO <sub>3</sub> was ferroelectric. Cross et al.,  It was reported by Matthias et al. in 1951 that NaNbO <sub>3</sub> was ferroelectric but antiferro-									
a	It was reported however, pro-	ed by MATTHIA ved in 1955 th:	as et al. in 1951 that at room tempe	hat NaNbO <sub>3</sub> wa erature it is not	; ferroelectric b	ut antiferro-	51M2 55C2				
	electric.	electric.									
ь	phase					P	1				
	state	F	A	pseudo-	tetragonal	cubic					
	crystal	monoclinic	orthorhombic	tetragonal							
	system		Pbma <sup>a</sup> )-D <sup>11</sup> <sub>2h</sub>			Pm3m-O <sub>h</sub>	a)61W2				
	space group			54 50	62 64	40 °C ∣	58R3				
	Θ**	1	200				1				
'	$P_{\bullet} \parallel [001] \text{ in}$	phase v. $a = 5.568 \text{Å}$ (	$(\cong \sqrt{2}a_0), b=5$	5.505 Å (≅ √2¢	$(c_0), c = 15.518$	$3 \text{ A } (\cong 4a_0),$	51V3				
, ,	l where a. is t	the lattice con	ISCALLE OF ALLE	م عمدات و	a unit cell is ta	ken as the c	1				
	I In phase IV	(ULTUOLITOIIIO)	IC System, one	٠-٥-٠ ، ٢٠٠١	In Well a	and Megaw's	1				
}	analysis b ar	c axes were	stem of the axe e interchanged. inic unit cell (see	The orthornon	$b' = c, a' = c' ( \subseteq$	$\leq a_0$ ), $\beta' \cong \pi/2$ .	61W2				
\							51W1				
2a	Cooling met	hod from a m	nolten mixture o	1 Nagoos, 1.0g.	25, u==						
3	Crystal stru	cture: In pha	se IV, $Z = \delta$ .	-							
-	Tab. 1; Fig.		nal expansion):	For phase I, I	I, III, IV: Tab	. 2,3; Fig. 3.					
4	Lattice dist	ortions (them	$\begin{array}{l} \text{nai expansion}, \\ \text{: } a = 5.564 \text{ Å } (\text{s}) \\ \text{od *00} \end{array}$	$ \cong \sqrt{2} a_0$ ), $b = 5$	.548 Å ( $\simeq V2 a$	·o).	57]1				
1	For phase $c = 7.812$	$(\cong 2 a_0), \beta =$	= 91°09'.				3/1/				
	Fig. 4.						-				
5a	Dielectric c	onstants: Fig	$\frac{7.5.}{C/(T-\Theta_{\rm p})}, T >$	> Amery, who	ere $C = 2 \cdots 4$	· 105 °K and	54S3				
-	Curie-Weiss $\Theta_{\mathbf{p}} = 60 \cdots$	s law: $\varkappa = 0$ · 80 °C.	$/(1-\Theta_{\mathbf{p}}), 1$	. 0111-111			7500				
1			$n: P_a \cong 12 \cdot 10^{-1}$	² C m⁻² (   c, in	phase V).	. 4	55C2				
'	Coercive at	nd critical fiel	$n: P_{\mathbf{s}} \cong 12 \cdot 10^{-1}$ d for normal and	d double hyster	esis curve. 11g	,. 0.					
9:		nce: Fig. 7, 8.					55C2, 64p1,				
14	a Domain st	ructure: See					62M9, 62W3				
-	b Dynamic I	properties: Fig	z. 9, 10.		•.		1				
- 1	DI Dynamic 1	Mobor gross = 6	3 1								

Tab. 1. NaNbO<sub>3</sub>. Fractional coordinates x, y, z of atoms in unit cell at RT. [61W2]

	X	y	Z
Na(1) Na(2) Nb O(1) O(2) O(3) O(4)	0.769 0.261 1 0.271 0.010 0.446	0.250 0.251 0.257 0.208 0.290 0.532 0.972	0 1 0.125 0 1 0.121 0.126

According to Ismailzade phase III consists of 4 phases (see Fig. 3). [6314]

Transitions exhibit large temperature hysteresis, and the transition temperatures measured with decreasing temperatures. decreasing temperature are given here.



Tab. 2. NaNbO<sub>3</sub>. Lattice parameters at various temperatures. [56F1] and [54S3]

T[°C]	Crystal symmetry	Lattice :	parameters [54S3]		
	Jour Symmetry	[56F1]			
20	Monoclinic	a' = c' = 3.914  Å	a' = c' = 3.915  Å		
390	Pseudotetragonal	$b' = 4 \cdot 3.881 \text{ Å}$ $\beta' = 90^{\circ} 39'$ $a = 2 \cdot 3.920 \text{ Å}$ $c = 4 \cdot 3.926 \text{ Å}$	$b' = 4 \cdot 3.881 \text{ Å}$ $b' = 90^{\circ} 40^{\circ}$ $a = 2 \cdot 3.919 \text{ Å}$ $c = 4 \cdot 3.927 \text{ Å}$		
420	Pseudotetragonal	c/a = 2.0032 $a = 2 \cdot 3.924 \text{ Å}$	c/a = 2.0040		
560	Tetragonal (changing to simple perovskite-type cell)	$c = 4 \cdot 3.924 \text{ Å}$ $c = 4 \cdot 3.924 \text{ Å}$ $c/a \approx 2.0000$ $a = 2 \cdot 3.933 \text{ Å}$ $c = 4 \cdot 3.940 \text{ Å}$	$a = 2 \cdot 3.921 \text{ Å}$ $c = 4 \cdot 3.927 \text{ Å}$ $c/a = 2.0028$		
640 Tab 3	Cubic	c/a = 2.0038 a = 3.942  Å			

Tab. 3. NaNbO<sub>3</sub>. Lattice parameters of the subcell at various temperatures. [6314]. See Fig. 3

		t	emperatur	es. [63]	[4].	See Fi	e sut g. 3	ocel	l at var	ious
				Subcel	l par	ameter	s			
T [°	[C]	p	seudomon	oclinic ]	(a'	= c' >	b'. β	· >	90%	
<del></del>		a' [Å]	b' [Å	β	β' -90°		a'/b'		V [A3	
100	150 3.91 200 3.92 250 3.92 300 3.92 340 3.92		3.89 3.898 3.902 3.907	3,7 7,6 7,5	37 7 33 6 29 5 26 22 18 17		1.0075 <sub>5</sub> 1.0060 1.0055 1.0050 1.0040 1.0030 1.0025 1.0020 <sub>2</sub>		59.5 <sub>3</sub> 59.7 <sub>4</sub> 59.9 60.0 <sub>5</sub> 60.1 <sub>7</sub> 60.3 <sub>2</sub> 60.4	<u>, , , , , , , , , , , , , , , , , , , </u>
360			pseude	omonoc	linic	II ' -	0020	2 1	60.4 <sub>2</sub>	
380 400	3	3.927 <sub>8</sub> 3.92 3.927 <sub>8</sub> 3.92		3.920 3.921, 6 5 3.922, 4		1. 1. 1.	1.0020 1.0015, 1.0015		60.45 60.50 60.5 <sub>2</sub>	
420	1 2	.929	pseudo	monocli	nic I	II		•	00.52	
440 460	3	.930 .932	3.923 3.924 3.926 <sub>3</sub>		3 3 3		1.0015 1.0015 1.0015		60.5 <sub>5</sub> 60.60 60.70	
480	, ,	000	pseudor	nonocli	nic I	v		r	00.70	
500 510	3.	933 <sub>5</sub> 934 <sub>5</sub> 935	3.927 <sub>5</sub> 3.928 <sub>8</sub> 3.929 <sub>5</sub>		3 2 2		1.0015 <sub>2</sub> 1.0015 1.0015		60.7, 60.8 <sub>2</sub> 60.85	
			teti	agonal	I	,	<b>V1</b> 5	1	00.65	
T [°C]	C	[Å]	a = b [A	] c	la	T V I	Å37	$\top$		-
520 540 560	3.9	936, 938 939 <sub>8</sub>	3.929 <sub>5</sub> 3.930 <sub>2</sub> 3.931 <sub>6</sub>	1.0 1.0 1.0	1.0015, 1.0020, 1.0020,		V [Å <sup>3</sup> ]  60.80 60.85 60.90			-
580	1 3 9	41.	tetra	gonal I				•		
600 620 630	3.9	43, 45.	3.934₂ 3.937₃ 3.942 ≈3.945	1.0	020 015 010	61. 61. 61.	15 30			
		_	C	ubic	-30	01.4	+U			
T [°C]	a <sub>0</sub> [	Å]	V [Å3]	T [°	C)	a <sub>0</sub> [A	31		7 5 4 2 2	
640 650 680	3.94 3.94 3.94	7.	61.50 61.5 <sub>2</sub> 61.5 <sub>7</sub>	700 720	1	3.949 3.950	9,		V [Å <sup>8</sup> ] 51.6, 51.6,	

\* Nu \*\* Fo

2

1a	1a   Ferroelectricity in KNbO <sub>3</sub> was first discovered by MATTHIAS in 1949.									
b	phase IV III II I									
	state F F P									
ŀ	crystal system	rhombohedral	orthorhombic	tetragonal	cubic					
ľ	space group		Bmm2a)-C14		Pm3m-Oh	*)63K2				
	$\Theta$		10 22	25 4	35 °C					
2	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									
	Pulling method from Crystal form: square	m the K <sub>2</sub> CO <sub>3</sub> -Nb e plate	<sub>2</sub> O <sub>5</sub> mixture			58M3				
3	Crystal structure: 2				b. 4, 5; Fig. 11.					
4	Temperature depen	dence of lattice	parameters: Tab.	6; Fig. 12.						
5	Dielectric constant: Fig. 13, 14. $\kappa = C/(T - \Theta_p), T > \Theta_{II-I}, \text{ where } C = 2.42 \cdot 10^5 \text{ °K}, \Theta_p = 360 \text{ °C}.$ Nonlinear dielectric properties: $\xi = -1.62 \cdot 10^9 \text{ J C}^{-4} \text{ m}^5, \zeta = 1.79 \cdot 10^{10} \text{ J C}^{-6} \text{ m}^9.$ Spontaneous polarization and coercive field: Fig. 15. $P_8 = 26 \cdot 10^{-2} \text{ C m}^{-2} \text{ at } T = \Theta_p.$									
6	Transition heat, tra	insition entropy:	Tab. 7.			56T3				
7	Piezoelectricity: Fi	g. 16.								
12	NQR: Tab. 8; Fig. 17 ··· 20.									

Tab. 4. KNbO<sub>3</sub>. Atomic positions in fractional coordinates at RT in phase III. [67K4]

Nb	0, 0, 0
K	$0, \frac{1}{2}, \frac{1}{2} + z_{\mathbf{K}}$
O(1)	$0, \frac{1}{2}, z_1$
O(2)	$\frac{1}{4} + x_2, \ 0, \ \frac{1}{4} + z_2$
$z_{\rm K}$	+0.017
$z_1$	+0.021
$z_2$	+0.035
$\tilde{x_2}$	+0.004

Tab. 5. KNbO<sub>3</sub>. Interatomic distances and bond angles at RT. [67K4]

	*	distance Å	**	*	angle
Nb-O(1) Nb-O(2) Nb-O(2) K-O(1) K-O(1) K-O(2) K-O(2) O(1)-O(2) O(2)-O(2) O(2)-O(2) O(2)-O(2)	(2) (2) (2) (1) (2) (1) (4) (4) (4) (4) (1) (1) (2)	$\begin{array}{c} 1.991 \pm 0.001 \\ 1.863 \pm 0.007 \\ 2.180 \pm 0.009 \\ 2.837 \pm 0.014 \\ 2.848 \pm 0.001 \\ 2.883 \pm 0.014 \\ 2.792 \pm 0.008 \\ 2.873 \pm 0.010 \\ 2.780 \pm 0.012 \\ 2.884 \pm 0.012 \\ 2.802 \pm 0.024 \\ 2.894 \pm 0.024 \\ 2.860 \pm 0.001 \\ \end{array}$	O(2)(s)-Nb-O(2)(s) O(2)(l)-Nb-O(2)(l) O(2)(s)-Nb-O(2)(l) O(1)-Nb-O(2)(s) O(1)-Nb-O(2)(l) Nb-O(1)-Nb Nb-O(1)-Nb	(1) (1) (2) (4) (4) (1) (2)	$\begin{array}{c} 97.4 \pm 1.2 \\ 83.4 \pm 1.0 \\ 89.7 \pm 0.5 \\ 92.3 \pm 0.6 \\ 87.5 \pm 0.6 \\ 172.8 \pm 0.7 \\ 168.6 \pm 0.6 \end{array}$

Numbers in this column indicate numbers of equal bonds or angles per formula unit.

For the O-Nb-O angles, the letter s or l indicates whether the Nb-O(2) bond involved is short or long.

Tab. 6. KNbO<sub>3</sub>. Lattice constants and volume of unit cell at various temperatures. [54S3]. a', c': lattice parameters of pseudotetragonal cell

l ———		- Pacadott	magonal o	cell	
<i>T</i>	a' = c' Å	b Å	b/a	β	V
25 125 185 205 220 230 270 320 375 410 425 450 510	4.0375 4.0374 4.0363 4.0369 a = b 3.9972 3.9998 4.0023 4.0048 4.0080 4.0214 4.0225 4.0252	3.9711 3.9797 3.9830 3.9839 c 4.0636 4.0640 4.0647 4.0639 4.0639 4.0620 4.0567	1.0167 1.0145 1.0134 1.0133 <i>c/a</i> 1.0166 1.0166 1.0164 1.0154 1.0143 1.0122	90° 15' 90° 13' 90° 14'	64.73 64.87 64.89 64.93 64.92 64.95 65.01 65.10 65.15 65.18 65.03 65.09 65.22

Tab. 7. KNbO<sub>3</sub>. Transition heat and transition entropy per mole. [54S1]

		-1010. [7437]
Transition	△Q <sub>m</sub> cal mol <sup>-1</sup>	$\Delta S_{\rm m}$ cal °K <sup>-1</sup> mol <sup>-1</sup>
$\begin{array}{c} IV \rightarrow III \\ III \rightarrow II \\ II \rightarrow I \end{array}$	32 85 190 134	0.12 0.17 0.28

 $\frac{b'}{\beta}$  a' V

N<sub>1</sub>

b

2a

3

Tab. 8. KNbO<sub>3</sub>. NQR spectrum. [54C1]. The measured frequency ratios intersect the calculated ratios in a straight line at constant  $\eta=0.806\pm0.002$ .  $\eta=$  asymmetry parameter

		$\eta = \operatorname{asym}$	imetry paran	neter	$-0.006 \pm 0.002$ .
Crystal structure	f MHz	Meas- ured ratio	Calculated ratio (η = 0.806)	Identifi-	e²q Q/h MHz
orthorhombic (20 °C)	3.648		1	<del></del>	14112
(20 C)	3.030	1.204	1.204	(9/2, 7/2)	$23.120 \pm 0.05$
	1	1.198	1.196	(3/2, 1/2)	
	2.527	1 224		(7/2, 5/2)	
	2.085	1.214	1.213		
				(5/2, 3/2)	
rhombohedral	2.674		$(\eta = 0.0)$		
(-196 °C)	2.004	1.335	1.333	(9/2, 7/2)	$16.0 \pm 0.1$
110	2.004	1.503	1	(7/2, 5/2)	
1	1.335	1.505	1.500		
		•	1	(5/2, 3/2)	

Nr. 1A-3 NaTaO<sub>3</sub>, Sodium tantalate

ь	It was reported by anomalies of the d phase	lielectric constant	ts, however, were	. Jy OM	low 480 °C. No olenskii et al.	49M1 57S3
-	state	(F)		II	I	1
_	crystal system	orthorhombic	orthorhombic			
_	space group	Pc2 <sub>1</sub> n-C <sub>2</sub> v	Of thor Hombic	tetragonal	cubic	57K1
	a = 5.4941  Å, b = 3.4941  Å, b = 3.4941	nit cell and the p  = 4.	5130 Å at RT. eudomonoclinic i seudomonoclinic	n phase IV. Relicell: Fig. 21.	0 °C ation between	57K1 62I4 51V2

and

1]  $ol^{-1}$ 49M1 57S3 57K1 57K1 62I4 51V2

		,				[5/K]	J	atoms in				
		·	Na {	x: 0 - y: \frac{3}{4} - z: 0 -	- 0.01 + 0.03 + 0.02	$0 + 0.$ $\frac{1}{4} + 0.$ $0 - 0.$	01 03 02	-0.01 $+0.03$ $-0.02$	½ + ¾ + ½ +	0.01 0.03 0.02		
			Ta* {			1/2 1/2 0	( !		0 0 1 2			
			O(1) {	$x: 0 - y: \frac{3}{4} - z: \frac{1}{2}$	- 0.02 + 0.01 + 0.02	$0+0$ $\frac{1}{4}+0$ $\frac{1}{2}-0$	.02 .01 .02	$\frac{1}{2} + 0.02$ $\frac{3}{4} + 0.01$ 0 + 0.02	$\frac{1}{2}$ - $\frac{1}{4}$ + 0 -	0.01 0.02		
			O(2) {	x: \frac{1}{2} \cdot \frac{1}{	+ 0.04 0.03 + 0.04	$\frac{1}{4} - 0$ $0 - 0$ $\frac{3}{4} + 0$	.04 .03 .04	$\frac{3}{4} - 0.04$ $\frac{1}{2} - 0.03$ $\frac{3}{4} - 0.04$	\frac{2}{4} + \frac{1}{2} - \frac{1}{4} -	0.03 0·04		
			O(3) {	$x: \frac{1}{4}$ $y: \frac{1}{2}$ $z: \frac{1}{4}$	+ 0.04 + 0.06 + 0.04	$\frac{1}{2} + 0$ $\frac{1}{2} + 0$	.04 .06 .04	$\frac{3}{4}$ - 0.04 0 + 0.06 $\frac{3}{4}$ - 0.04	1 + 0 + 1 -	0.04 0.06 0.04		
	Ta	ib. 10.	NaTaO <sub>3</sub> .	Temper	rature de For the	pendenc notation	e of the s, see Fi	pseudo-oig. 21	cell para	meters.	[ <i>62I4</i> ].	
	C1	23	100	200	300	400	450	480	500	550	580	600
		3.8895	3.893 <sub>6</sub>	3.899 <sub>5</sub>	3.907	3.912 <sub>8</sub>	3.916	3.918	3.920	3.923	3.925,	3.927
a' = c	<del></del> 1	3.885 <sub>5</sub>	3.890 <sub>5</sub>	3.8965	3.9038	3.9102	3.9136	3.915 <sub>8</sub>	3.918	3.923	≈3.925 <sub>2</sub>	≈3.927
b' [Å]		22'00"	16'00"	9'00"	6'00"	4'00"	3'30"	2'00"	≈2'00"	1'30"	0'00"	0' 00 "
		1.0010	1.0009	1.0009	1.0008	1.0006	1.0006	1.0005	1.0005	1.000	1.000	1.000
$\frac{a'/b'}{V \ [\mathring{\mathbf{A}}]}$	81	58.80	59.0 <sub>0</sub>	59.2 <sub>5</sub>	59.5 <sub>5</sub>	59.85	60.0 <sub>0</sub>	60.1 <sub>0</sub>	60.2 <sub>0</sub>	60.3 <sub>5</sub>	60.45	60.5₅
, fir	י נ	JU.00	, 51110	_	<i>T</i> [°C]	630	660	680				·
				$\overline{b}$	= a = c [Å]	3.929	3.931	3.932 <sub>5</sub>	·			
1				ī	/ [ų]	60.65	60.7 <sub>5</sub>	60.8 <sub>0</sub>				
Nr. 1.	A-4	KTaO <sub>3</sub> ,	Potassiu	ım tantal	late							
1a	Ferro studi least	electric es by W above 1	activity /EMPLE h	was firs	st report ved that	the left	ocice trie	s in 1949 transitio	);a) how n does n	ever, rec ot occur	, at b)64	0M1, 49M4 1W2, 65W2 W2, 65W2, W2
	KTaO <sub>3</sub> is cubic and its space group is Pm3m-O <sub>1</sub> . $T_{\text{melt}} = (1357 \pm 3)  ^{\circ}\text{C}.$ $\varrho = 6.97 \cdot 10^3  \text{kg m}^{-3}.$ $a = 3.9885  \text{Å at RT}.$ Transparent, colorless or pale blue (blue in oxygen-deficient crystals).  Cleavage: along (100) planes.											
2a	Hare	method	early the	ıx,*) dar	k small o			flux,b) la d quality			64 67	2T5, 64W2 66U1 1W2, 65W2 7B7
	Dha	ra diam	hnique: am of synal phase	stem K.(	(),-1a,(	<i>J</i> c. F12. 4	4. at 400	°C:				5W 8 7M 2
3	Z = Cry: K a	etal etm	cture: cu ition; T	ibic pero a at 1b p	vskite ty position;	pe, (Pm 30 at 3	3m-Oh). c positio	on.			5	1V1, 51V2

All positions  $\pm 0.002$ .

NN spi (I est Nu sit

EE a a E L E E P T T b d F P | E F a F |

1

Tab. mode: The soft r

*T* [°]

13b

17

12a

	1A-4 KTaO; continued	51 V 2,	59B1
		-> rott 2	
Di	= 3.9885 Å at RT; $a = 4.0020$ The electric constant at low frequencies: earlier studies showed a peak in the $\times$ vs. $T$ rve: $^{a}$ ) recent measurements have shown that no peak exists down to 1.6 °K. $^{b}$ )	65W2 65W2	2,64W 2
011	the state and a st	64W	
×	= 243 at R1. = $x_0 + C/(T - \Theta_p)$ $T > 30 °K$ , where $\kappa_0 = 40$ , $C = 30$ .	64R3 64W	3
D	response tangener. See tangener to the GHz range: Fig. 20. See tangener to the GHz range: $Q = 10^3 \cdot \cdot \cdot \cdot 10^4$ . Values in the GHz range: $Q = 10^3 \cdot \cdot \cdot \cdot 10^4$ . Values in the far infrared frequency range: See 1A-4-9 below (Figs. 34, 35). Values in the far infrared frequency range: See 1A-4-9 below (Figs. 34, 35). Values in the far infrared frequency range: See 1A-4-9 below (Figs. 34, 35).		
1	and at Ref. 2 - 8	65K	1
10	coefficients in 160-3 at $4.2  ^{\circ}$ K, $\xi = (4 \pm 1) \cdot 10^{\circ}$ V in	65 W	12
١,	ovs. E curves show no hysteresis character down to 1.6 °K.  P vs. E at 4.2 °K: see	64W	
a	Refractive index in visible region: Fig. 30. Reflectivity in far infrared region and the dispersion: Figs. 31, 32. Reflectivity in far infrared to obtain transverse optical modes of the lattice vibration	631	M4, 67P
	by means of Kramers-Kronig relation (cf. 1ab. 42). Tab. 11; Fig. 33. Transverse optical modes as a function of temperature: Tab. 11; Fig. 33. Transverse optical modes are number $\tilde{r}_{tt}$ for the "ferroelectric mode" is approximately	y 671	P4, 67F2
	The square of the linear to $T: \tilde{v}_{11}^2 \propto (T - \Theta_p)$	1 07	S <i>9</i>
	Imaginary part of the dielectric constant and the dielectric constant	65	W2
	Absorption coefficient $\alpha$ depends on the degree of oxystem (about 3.6 eV) for insulating the first oxystem of the coefficient near the interband absorption edge (about 3.6 eV) for insulating Absorption coefficient near the interband absorption edge (about 3.6 eV) for insulating Absorption coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the interband absorption edge (about 3.6 eV) for insulating the coefficient near the coeff	67	B1
	Absorption vs. carroy Optical absorption in impurity doped single crystais. for the	6	4W2
ь	Cr, see Cr, see Quadratic electrooptic constants $(6328 \text{ Å}, 2 \cdots 77^{\circ} \text{ K})$ : Quadratic electrooptic constants $(6328 \text{ Å}, 2 \cdots 77^{\circ} \text{ K})$ : $M_{11} - M_{12} = (0.16 \pm 0.01) \text{m}^4 \text{ C}^{-2}$ ; $M_{44} = (0.12 \pm 0.01) \text{ m}^4 \text{ C}^{-2}$ . $M_{11} - M_{12} = (0.16 \pm 0.01) \text{m}^4 \text{ C}^{-2}$ ; $M_{44} = (0.12 \pm 0.01) \text{ m}^4 \text{ C}^{-2}$ . Electroreflectance and electroabsorption were studied using semiconducting KTa's Electroreflectance dc field on the reflectance of the (100) surface: Fig. 39. Effect of interface spectra of (100) and (111) surfaces: Figs. 40, 41. Electroreflectance spectra of (100) and (111) surfaces: Fig. 42. Effect of polarization of light on the electroreflectance: Fig. 43.	O <sub>3</sub> .	4G3, 63G 7F4
	Electrorehectance state absorption edge: Fig. 41.  Electroabsorption near the absorption edge ( ≈ 3.6 eV) shifts to higher energies with dc bias: Fig.	45.	67B1, 60
d	- 1 rotation near the band edge. 138.	1	67F2
f	Electric-field-induced Raman effect: Fig. 47.  Electric-field-induced Raman effect: Fig. 47.  (For the ferroelectric soft mode obtained from the Raman scattering, see Fig. 3  (For the ferroelectric soft mode obtained from the Raman scattering, see Fig. 3  Fluorescence spectrum of Eu <sup>3+</sup> in KTaO <sub>3</sub> : see		6559
10	Fluorescence spectral	cient	65W2
	Most data on KTaO <sub>3</sub> .  semiconducting KTaO <sub>3</sub> .  Semiconducting KTaO <sub>3</sub> .  Rejectivity of oxygen-deficient single crystals as a function of temperature: Fig. 1. September 1. September 2. Se		65W2
	Hall mobility $8 \cdot 10^4 \text{ T}^{-3} \text{ m}^2 \text{ V}^{-1} \text{ sec}^{-1}$ , $T > 100^{-1} \text{ K}$ , $10^{-1} \text{ F}^{-1}$ for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and Hall mobility at 4.2 °K and RT for several semicondulum of the coefficient and	cting	
- \	Hall mobility vs. carrier concentration: Fig. 30.  Hall mobility vs. carrier concentration: see		65W2 66S17 66W5
ı	Ca concentration in dopon hardrostatic pressure. Fig. 31.		65W2
	Electrical conductivity vs. hydrostatic probability for the figure of the first probability in the far infrared region: see Fig. 35.  Conductivity in the far infrared region:		1 02W 2

12a	NMR of <sup>181</sup> Ta in KTaO <sub>3</sub> : spin-lattice relaxation time, $T_1 \approx 10^{-3}$ sec at RT; spin-spin relaxation time, $T_2 = \approx 10^{-5}$ sec at RT; nuclear magnetic moment of <sup>181</sup> Ta ( $I = 7/2$ ): $p_n = (2.340 \pm 0.001) \mu_n$ (uncorrected); $(p_n = (2.35 \pm 0.01) \mu_n$ , after estimated corrections). Nuclear magnetic acoustic resonance: the absorption data were given for $\Delta m = \pm 2$ transition of <sup>181</sup> Ta as a function of the angle between magnetic field and sound axis [100].							
b	ESR of Eu²+ and Gd³+ in KTaO₃: Tab. 14. ESR of Fe³+: $g=1.99\pm0.01$ ; $ a =(345\pm10)\cdot10^{-2}$ m <sup>-1</sup> at 4.2 °K; $a=(288\pm5)\cdot10^{-2}$ m <sup>-1</sup> at RT (Fe³+ is on the Ta⁵+ site). $a=(30\pm1)\cdot10^{-2}$ m <sup>-1</sup> at RT (Fe³+ is on the K¹+ site). ESR Stark effect for Fe³+: $E_{\text{bias}}$ along [100] induces axial splitting term $D$ ( $D=12\cdot10^{-2}$ m <sup>-1</sup> at $E_{\text{bias}}=1.0$ MV m <sup>-1</sup> at 4.2 °K; $D\propto E_{\text{bias}}^2$ ). ESR of Ni³+ located on Ta⁵+ site (low spin state) and on K¹+ site: see ESR in Mn-doped, Co-doped and Cr-doped KTaO₃: see							
13b	( 1) 1 D' 50 T.1 45							
	TITE							
17	Band structure and the related p	roperties: see references;	also 1A-4-9a, 9b, 9d, 10,	64W2 67F4, 67B1				
17	Band structure and the related p	roperties: see references;	also 1A-4-9a, 9b, 9d, 10,					
17	Band structure and the related p and Tab. 12. Band gap energies determined by	various methods:  296 °K  3.77 eV  3.62 eV  3.57 eV						
17	Band structure and the related p and Tab. 12. Band gap energies determined by  Method  Faraday rotation	various methods:  296 °K  3.77 eV  3.62 eV	77 °K	67F4, 67B1				

The wave number  $\tilde{v}_{t1}$  (ferroelectric soft mode) is temperature dependent.

57P4

67F2

63G3

1,66B2

V 2

W2

:W2 :W2

troreflectance spectra (in eV) [67F4]. See Figs. 40, 41

	$\widetilde{v}_{t1}$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\tilde{v}_{i3}$		$E_1$	$E_2$	A 1	A' <sub>1</sub>	A 2
T [°K]		· 10 <sup>2</sup> m <sup>-1</sup>				'	[eV]		
12 126 232	25 58 79	196 198 198	551 551	KTaO <sub>3</sub> (100) KTaO <sub>3</sub> (111) KTaO <sub>3</sub> (110)	3.57 - 3.55	3.80 3.77 3.80	4.40 4.45 4.47	4.88 4.90 4.85	5.50 5.47 5.50
295 463	88 106	199 199	550	<b>5</b> , , .			•		

Tab. 13. KTaO<sub>3</sub> (reduced). Hall coefficient  $R_{\rm H}$  and Hall mobility  $\mu_{\rm H}$  at 295 °K and 4.2 °K for single crystals [65W2]. Carrier concentrations N are calculated from the 4.2 °K Hall coefficient using  $R_{\rm H}=-1/Ne$ 

Sample	$N_{ m calc}$	R m³ (		$^{\mu_{ m H}}_{ m m^2~V^{-1}~sec^{-1}}$		
Nr.	m <b>-3</b>	(295°K)	(4.2°K)	(295°K)	(4.2°K)	
1 2 3 4 5 6	3.5 · 10 <sup>23</sup> 6.0 · 10 <sup>23</sup> 6.6 · 10 <sup>23</sup> 2.4 · 10 <sup>24</sup> 7.8 · 10 <sup>24</sup> 1.3 · 10 <sup>25</sup>	20.3 · 10 <sup>-6</sup> 12.9 · 10 <sup>-6</sup> 11.5 · 10 <sup>-6</sup> 3.0 · 10 <sup>-6</sup> 1.0 · 10 <sup>-6</sup> 0.62 · 10 <sup>-8</sup>	18 · 10 <sup>-6</sup> 10.4 · 10 <sup>-6</sup> 9.4 · 10 <sup>-6</sup> 2.6 · 10 <sup>-6</sup> 0.80 · 10 <sup>-6</sup> 0.48 · 10 <sup>-6</sup>	2.7 · 10 <sup>-3</sup> 2.9 · 10 <sup>-8</sup> 3.1 · 10 <sup>-3</sup> 3.0 · 10 <sup>-3</sup> 3.0 · 10 <sup>-3</sup> 3.1 · 10 <sup>-3</sup>	2.3 1.9 1.9 1.1 0.53 0.34	

]	Figuren S. 221 II.				in single crystals of
Ī		FSR spectrum of Eu <sup>2+</sup> a	nd Gd3+ i	ons, doped	III SHIGIC OF JOSES
	Tab. 14. KTaO <sub>3</sub> .	Parameters of ESR spectrum of Eu <sup>2+</sup> a KTaO <sub>3</sub> [66U1]			
- 1				-c 1	HFS

Tab. 14. KTa	аО <sub>3</sub> . Р	arame	eters	T	- K	TaO <sub>3</sub> [66U1]	FS		HFS
Para- magnetic	Site	S	Ж	gHz	T °K	g-factor	b <sub>40</sub> , b <sub>60</sub> 10 <sup>-2</sup> m <sup>-1</sup>	I	A 10 <sup>-2</sup> m <sup>-1</sup>
center Eu <sup>2+</sup>	   K+	7/2	(8)	9.1	77	1.990 ± 0.002	060 - (1)	5/2 5/2	$\begin{vmatrix}  ^{151}A  = 36 \pm 1 \\  ^{153}A  = 16 \pm 1 \end{vmatrix}$
Gd <sup>3+</sup>	-	7/2			4.2	$1.990 \pm 0.002$	$\begin{array}{c} b_{40} = -8.14 \pm 0.27 \\ b_{60} = +0.47 \pm 0.3 \end{array}$		
Gu					77	$1.990 \pm 0.002$	$b_{40} = -7.0 \pm 0.3 b_{60} = +0.5 \pm 0.5$		
		1	1	1	l				Phonon energies

# Nr. 1A-5 CaTiO<sub>3</sub>, Calcium titanate (Perovskite)

Tab. 16. CaTiO<sub>3</sub>. Ion positions. [57K2]

 $\frac{1}{2}$ , 0, 0; 0, 0,  $\frac{1}{2}$ ;  $\frac{1}{2}$ ,  $\frac{1}{2}$ , 0; 0,  $\frac{1}{2}$ ,  $\frac{1}{2}$ . 4 Ti in 4(a):  $x, \frac{1}{4}, z; \overline{x}, \frac{3}{4}, \overline{z}; \frac{1}{2} + x, \frac{3}{4}, \frac{1}{2} - z; \frac{1}{2} - x, \frac{1}{4}, \frac{1}{2} + z;$ 

4 Ca in 4(c): with x = 0, z = 0.030.

with  $x = \frac{1}{2} - 0.037$ , z = -0.018. 4 O in 4(c):

8 O in 8(d):  $x, y, z; \frac{1}{2} - x, \frac{1}{2} - y, \frac{1}{2} + z;$  $\overline{x}$ ,  $\frac{1}{2} + y$ ,  $\overline{z}$ ;  $\frac{1}{2} + x$ ,  $\overline{y}$ ,  $\frac{1}{2} - z$ ;  $\overline{x}$ ,  $\overline{y}$ ,  $\overline{z}$ ;  $\frac{1}{2} + x$ ,  $\frac{1}{2} + y$ ,  $\frac{1}{2} - z$ ;  $x, \frac{1}{2} - y, z; \frac{1}{2} - x, y, \frac{1}{2} + z;$ 

with  $x = \frac{1}{4} - 0.018$ , y = -0.026,  $z = \frac{1}{4} - 0.018$ .

Tab. 15. KTaO<sub>3</sub>. Phonon energies of the soft ferroelectric mode (transverse optical mode) at various temperatures [67S11]. The wave vector q at the zone boundary is 0.788 Å<sup>-1</sup> (=  $\pi/a$ ). See Fig. 52

••••			
T °K	Phono	n energy [ r q [Å-1] =	=
°K	0	0.1	0.2
295	10.7	11.5	13.5
230 170	9.7 8.6	10.0	12.5
120 77	7.3 5.7	7.5	10.7
40 28	4.2 3.6	6.0 5.9	10.5
15 10 4	3.0 3.2 3.1	5.3 5.2 5.3	9.8
1			

57K2 46N1 62M3

62M3 57K2

57K2

62M3

46N1

58L1, 62M3 57K2

1a	Specific heat anomaly associated with a phase transition was observed in CaTiO <sub>3</sub> at about 1260 °C by Naylor et al. in 1946. Gränicher et al. reported that CaTiO <sub>3</sub> becomes cubic above 1260 °C.	46N1, 54G1
1	becomes cubic and I	
b	phase P	54G1

1	becomes cubic and	, TT 1	I
b	phase		P
	state	orthorhombic	cubic
	crystal system	orthornombie	
	space group	Pcmn-D <sub>2h</sub>	
	G Space 8	≈12	260 °C
	4 10 · 103 kg m	n−3 at RT.	

 $\varrho = 4.10 \cdot 10^3 \text{ kg m}^{-3} \text{ at RT.}$   $T_{\text{melt}} = 1960 \,^{\circ}\text{C}$   $a = 5.3670 \,\text{Å}, \, b = 7.6438 \,\text{Å}, \, c = 5.4439 \,\text{Å} \text{ at RT.}$ a = 5.5010 A, v = 1.0430 A, v = 5.4437 A at R1. The ideal perovskite cubic unit cell becomes pseudo-monoclinic in phase II in the same manner as shown in Fig. 21.  $\beta' = 90^{\circ}$  48' at RT.

Transparent, colorless. Flux method; flux: CaCl<sub>2</sub>, BaCl<sub>2</sub>, CaCl<sub>2</sub>+BaCl<sub>2</sub>, Na<sub>2</sub>CO<sub>3</sub>+K<sub>2</sub>CO<sub>3</sub>.

Flame fusion method:

Crystal structure: Z = 4 in phase II. Fig. 55; Tab. 16. 3

Lattice distortion: Fig. 56. Dielectric constant:  $\kappa = 186$ ,  $\tan \delta = 3 \cdot 10^{-4}$  at RT. 4 5a Fig. 57.

Specific heat: Fig. 58. Transition heat:  $\Delta Q = 550$  cal mol<sup>-1</sup> at  $\Theta_{\text{II-I}}$ . 6a

9a	Refractive indices: Fig. 59. Reflection and absorption: Fig. 60, 61.							
17	Hardness: Mohs 6.5 ··· 7, Knoop 986	62M3						
Nr. 1	A-6 SrTiO <sub>3</sub> , Strontium titanate							
1a	Ferroelectric-like behavior of SrTiO <sub>3</sub> was first observed by Gränicher in	1956. 56G2						
b	phase   II*   I	62R1						
-	state (F) P	İ						
-	crystal system tetragonal cubic**							
-	space group Pm3m-Oh							
	Θ 110 °K							
	$T_{\text{melt}} \cong 2000  ^{\circ}\text{C}.$	63f2, 64l1 63f2						
	$\varrho = 5.11 \cdot 10^3 \text{ kg m}^{-3}$ . $a = 3.905 \text{ Å at RT}$ .  Transparent, colorless	64L4						
2a	Crystal growth: Flux method (flux: KF or 50% Na <sub>2</sub> CO <sub>3</sub> + 50% K <sub>2</sub> CO <sub>3</sub> ).	57N1 61G1						
	Flame-fusion (Verneuil) method. Phase diagram of the system SrO-TiO <sub>2</sub> is given in Figs. 297 and 289 of [6-							
3	Crystal structure: $Z = 1$ . Fig. 62.							
4	Thermal expansion: Fig. 63.							
5a	Dielectric constant: Figs. 64 ··· 76. Expression of $\kappa$ vs. $T$ curve: Curie-Weiss law: $\kappa = C/(T - \Theta_p)$ , $T > 70$ °K, where $C = 7.83 \cdot 10^4$ °K, $\Theta_p = 28$ °K $\kappa = M/[(T_1/2) \coth(T_1/2T) - T_0]$ , $T < 50$ °K, where $T_0 = 38$ °K, $T_1 = 84$ °K,							
b	$M = 9 \cdot 10^4$ °K. Coefficients of free energy expansion at low temperatures:							
С	Saturation polarization: Fig. 77. Remanent polarization: Fig. 78.							
d	Electrocaloric effect: Fig. 79. For additional data, see	64K5, 65 61H1						
6a	Specific heat: Fig. 80. Specific heat below 1 °K, see	61g1, 66.						
Ъ	Thermal conductivity: Figs. 81, 82. For ceramics: see also	58Y1, 60 61g1, 66						
7a	Piezoelectricity (dc bias induced piezoelectricity): Figs. 83, 84, 85.							
Ъ	Electrostriction: Fig. 86.							
8a	Elastic compliances and stiffnesses: Tab. 17; Figs. 87, 88, 89.							
9a	Refractive indices: Tabs. 18, 19; Fig. 90. Reflectivity, absorption coefficient and dielectric constant: (i) Infrared region: Figs. 91 ··· 95. See also Tab. 42. (ii) Visible and ultraviolet region: Figs. 96 ··· 102. See also Tab. 43.							
ь	Quadratic electrooptic effect: $M_{11} - M_{12} = (0.14 \pm 0.01)$ m <sup>4</sup> C <sup>-2</sup> at 6328 Å (4.2 ··· 300 °K).							
C	Piezooptic effect: Tabs. 20, 21.	I						

ergies trans-arious

wave ary is ig. 52

<u>v</u>]

0.2 13.5 12.5 10.7 10.5

9.8

1,54G1

ì1 *Κ2* N1

M3 M3 K2

7K2

2M3

!6N1

'K2 ?L1, 62M3

d

s. [64L4], [66C6]

	S. 236ff. II 1 Oxide des Perowskit-Typs	67B1
oa   1	Nr. 1A-6 SrTiO <sub>3</sub> continued Faraday rotation: Fig. 103. See also Tab. 44.	
e	Raman effect: Fig. 104.	66K1 61g1 61g1
0	Brillouin stattering: $\theta$ See See Electrical resistivity: $\theta > 10^7 \Omega \text{m}$ (good quality single crystal) at RT. Fig. 106. For additional data, see	
	Fig. 106. For additional data, see Fig. 106. For additional data, see Tab. 22. Resistivity, Hall coefficient and Hall mobility of semiconductive samples: Tab. 23; Figs. 107 ··· 110.	64F5, 67T6
	For additional data, sto excited electron: see Fig. 113.	66T10
	Photoconductivity: Figs. 114, 115.  Photoconductivity: Figs. 116.  The transferon: Fig. 116.	6455
	Superconductivity: discovered in semiconductive SrTiO <sub>3</sub> is of the order Figs. 117 ··· 120. Tab. 24. Penetration depth of static magnetic field in superconductive SrTiO <sub>3</sub> is of the order	66S16
	of 10 <sup>-5</sup> m.  Magnetic susceptibility: Tab. 25.	
11	NMR: Fig. 121.	
12a	ESR: Tab. 26; Figs. 122 ··· 130.	
b	Mössbauer effect: Figs. 131, 132.  Mössbauer effect: Figs. 131, 132.  Tab. 27: Figs. 133, 134, 135.	
c		
13c	-t-moture. A lille twin south, at the 900 domains in totals	61M3, 64L
	The dc field, however, does not change the twin out	66R6
16	Radiation damage: Fig. 136.	i-
17	Etching and chemical poissing.  Band structure and related properties: The band structure was determined.  Band structure and related properties: The band structure was determined.	64K1 65S18 66F3, 67F
	For discussions, see Magnetoresistance, Shubnikov-deHaas effect. Magnetoresistance, Shubnikov-deHaas effect. The conduction band consists of spheroids along [100] having 3 minima at $X_3$ . The conduction band consists of spheroids along transverse and longitudinal effective electron mass: $m_1 = 1.5 m_0 (\pm 15\%)$ , $m_1 = 6.0 m_0 (\pm 30\%)$ .	67F3

# Tab. 17. SrTiO<sub>3</sub>. Elastic constants at RT

	Tab. 17.	SrTiO <sub>3</sub> . E	Elastic con	Stanto ut		
	1 6	C 12	c 13	Method	Note	Reference
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1011 N m-2		nosite-	c calculated	58p5
1 0.74 8	4 3.48	1.01	1.19	composite- bar	from s s calculated	63B2
5.5	.091 3.181	1.025	1.236	pulse	from c s calculated	63W1
3.729	3.156	1.027	1.215 ±0.006	pulse	from c	1
$\begin{vmatrix} 3.772 & -0.926 & 8 \\ +0.023 & \pm 0.010 & \pm 0 \end{vmatrix}$	$0.040 \mid \pm 0.027$	±0.027	土0.000	ı	G TE'O M 175	2 [65 <i>B9</i> ]

±0.023	7		±0.027   ∃			Tab. 1	19. SrTiO <sub>s</sub> .	n vs. λ [6.	5B9]
T	ab. 18. Sr	TiO <sub>3</sub> . n v	s. λ at 21 °	2 (57G1)	n	λ μm	n	λ μm	n
λ Å	n	Â	n	Á 6600	2.3771	0.45	2.537 2.472	1.8 2.0	2.270
4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300	2.6050 2.5810 2.5585 2.5394 2.5236 2.5101 2.4970 2.4846 2.4734 2.4636 2.4548 2.4464	5400 5500 5600 5700 5800 5900 6000 6100 6200 6300 6400 6500	2.4386 2.4312 2.4245 2.4182 2.4122 2.4069 2.4019 2.3971 2.3928 2.3886 2.3886 2.3807	6700 6800 6900 7000 7100 7200 7300 7400 7500 7600 7700	2.3737 2.3703 2.3674 2.3645 2.3617 2.3590 2.3564 2.3538 2.3514 2.3490 2.3468	0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.4 1.6	2.402 2.363 2.340 2.326 2.315 2.306 2.299 2.287 2.279	2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8	2.258 2.2524 2.2490 2.2395 2.2315 2.2236 2.2143 2.2058 2.1951

Tab. 20. SrTiO<sub>3</sub>.  $\Pi_{66}$  vs.  $\lambda$  at (27  $\pm$  1) °C. [57G1]

Tab. 21. SrTiO<sub>3</sub>.  $\Pi_{21} - \Pi_{11}$  vs.  $\lambda$  at  $(27 \pm 1)$  °C. [57G1]

λ Å	П <sub>66</sub> 10 <sup>-13</sup> m <sup>2</sup> N <sup>-1</sup>	λ Å	$II_{66}$ $10^{-13} \mathrm{m}^2 \mathrm{N}^{-1}$	λ Å	$\Pi_{21} - \Pi_{11}$ $10^{-13} \mathrm{m}^2 \mathrm{N}^{-1}$	λ Å	$\begin{array}{c c} \Pi_{21} - \Pi_{11} \\ 10^{-13} \mathrm{m}^2 \mathrm{N}^{-1} \end{array}$
4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900	-3.69 -3.74 -3.78 -3.99 -3.965 -4.13 -4.09 -4.22 -4.33 -4.32 -4.41 -4.51 -4.59 -4.575 -4.62 -4.69 -4.79 -4.85	6000 6100 6200 6300 6400 6500 6600 6700 6800 6900 7000 7100 7200 7300 7400 7500 7600 7700	- 4.92 - 4.99 - 5.05 - 5.12 - 5.13 - 5.18 - 5.22 - 5.29 - 5.52 - 5.48 - 5.555 - 5.62 - 5.77 - 5.73 - 5.78 - 5.79 - 5.825 - 5.98	4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900	9.03 9.23 9.03 9.26 9.12 9.12 9.14 9.16 9.35 9.44 9.61 9.54 9.68 9.56 9.85 9.85	6000 6100 6200 6300 6400 6500 6600 6700 6800 6900 7000 7100 7200 7300 7400 7500 7600 7700	9.95 9.94 9.91 9.84 9.82 9.88 9.96 9.92 9.98 9.99 9.91 9.92 9.94 9.99 10.05 9.90 9.92

Tab. 22. SrTiO<sub>3</sub> (single crystal). Effects of electrode material on the apparent conductivity [65C6]. Measurements were made by the two terminal method at T=130 °C, t=24 hours after the application of the field E=100 kV m<sup>-1</sup>

Electrode material	$\sigma  [\Omega^{-1}  \mathrm{m}^{-1}]$ after 24 h at 130 °C	Form of σ vs. t curve
Au Ag Sn Cr Cd Al	$4.8 \cdot 10^{-7}$ $8.8 \cdot 10^{-8}$ $8.8 \cdot 10^{-9}$ $6.0 \cdot 10^{-11}$ $9.5 \cdot 10^{-11}$ $2.9 \cdot 10^{-10}$	Fall then rise As for gold Fall followed by slow rise but without saturation Continuous fall tending toward steady value Similar to chromium Similar to chromium (for a field of 400 kV m <sup>-1</sup> behavior is like that of gold)

Tab. 23. SrTiO<sub>3</sub> (single crystal). The 300 °K and 2 °K Hall coefficient  $R_{\rm H}$  and Hall mobility  $\mu_{\rm H}$  values and the 300 °K electron concentrations for semiconductive single crystals. [67T6]. In the first column, (Nb) means Nb-doped samples, the other samples are reduced ones

	300	°K		°K	$n = \frac{1}{eR_{\rm H} (300  {}^{\circ}{\rm K})}$
Sample	R <sub>H</sub> 10 <sup>-6</sup> m <sup>3</sup> C <sup>-1</sup>	$\mu_{\rm H}$ 10 <sup>-4</sup> m <sup>2</sup> V <sup>-1</sup> sec <sup>-1</sup>	R <sub>H</sub> 10 <sup>-6</sup> m <sup>3</sup> C <sup>-1</sup>	$10^{-1}$ m <sup>2</sup> V <sup>-1</sup> sec <sup>-1</sup>	m <sup>-3</sup>
5 2 3 6 12 9	0.26 0.62 1.8 5.3 14.0 23.0	6.5 5.2 7.2 8.0 8.0 5.8	0.25 0.77 3.9 11.0	1.0 1.8 2.7 3.1	$\begin{array}{c} 2.4 \cdot 10^{25} \\ 1.0 \cdot 10^{25} \\ 3.5 \cdot 10^{24} \\ 1.2 \cdot 10^{24} \\ 4.5 \cdot 10^{23} \\ 2.7 \cdot 10^{23} \end{array}$
13(Nb) 8(Nb) 10(Nb) 14(Nb) 15(Nb) 11(Nb)	0.22 0.58 3.4 14.0 22.0 44.0	5.5 4.8 6.2 6.7 5.4 6.0	0.22 0.63 3.3 11.0 18.0 33.0	3.3 8.2 12.0 13.0 19.0 22.0	$\begin{array}{c} 2.8 \cdot 10^{25} \\ 1.1 \cdot 10^{25} \\ 1.8 \cdot 10^{24} \\ 4.5 \cdot 10^{23} \\ 2.8 \cdot 10^{23} \\ 1.4 \cdot 10^{23} \end{array}$

Tab. 24 see page 50

7 2.270 2.264 2.258 2.2524 2.2490 2.2395 2.2315 2.2236 2.2143 2.2058 2.1951

7T6

, 64L4

:, 67F3

ference

58p5 63B2 63W1

			<del></del>					ue a	C.5 .	1 61	J W.		ı yı	)S							
f the lowest five differ-		Far infrared	1.2a)	3.00)	2.63b)			-	Liter-	ature	50167	62M6	59M4		(	2086	58M8		62R3	62R3	
ency o = 0 for	1018 500-1	Far							ρ			<u>.</u>				<u> </u>	· (g		6	Đ	6
Tab. 27. SrTiO <sub>3</sub> . The frequency of the lowest transverse optic mode at $q=0$ for five different temperatures. [62C4]	100	Neutron	1.23 ± 0.03 1.72 ± 0.04	H-H	$3.32 \pm 0.07$	b) [62S12]		agnetic ions	HFS	nA [10-3 m-1]	63A = 0	$^{68}A = 16.2 \pm 0.3$	II	$^{60}A = -69.4 \pm 1$							
27. S 18verse	T	Ä.	90	296	430	a) [62B2]		param		I	3/2   6	<del>'                                    </del>	5/2	8							
Tat		į		•••	,	(e)	7	nofon			0	0	0 0			0			-		
Tab. 25. SrTiO <sub>3</sub> . Susceptibility in pure and reduced single crystals [66F2]. $\chi_{\text{magn g}}$ represents the contribution from the charge carriers; $d\chi_{\text{magn g}}$ is obtained by measuring the $\chi_{\text{magn g}}$ of reduced crystals and subtracting the "pure" diamagnetic and Van Vleck contributions. $N$ = carrier concentration; $T_{\text{deg}}$ = degeneracy temperature; $m^*$ = density-of-state effective.	m* at 4.2 °K	$[m_0]$	1 1.53	l	4.9		Summary of the properties of ESR spectrum in SrTiO, for various done	FS		4	$= 2 \pm 0.3$ , $E =$	0,	$= \pm 1.0, \qquad E = -0.7 \qquad E = -0.7$	$+17.9 \pm 1.0$	$-230 \pm 10$ , $+16.1 \pm 0.7$ ,	$= -225.6 \pm 1.9$ = $+7.3 \pm 0.3$ , E =	$= -220.8 \pm 1.1$ = 1.0, F =	97.7 ± 0.7			
als [66] ined b Vleck of	g-1	4.2° X	-0.92 +0.928	-0.919	+1.719		trum ir	-	<u> </u>	- -	9				2 0		Da	8			
l single crystament is obtatic and Van = density-o	mg·10-7 cm <sup>3</sup>	-	-1.00 +0.073 +0.523 +	-1.012	+1.763   +		of ESR spect	tor	8	ξ	(acciropic)	(isotropic)	(isotropic)	(isotropic)	(isotropic)	(isotropic)	(isotropic)	(icontrosi)	(Judomost)	$2.352 \pm 0.001$	
Tab. 25. SrTiO <sub>3</sub> . Susceptibility in pure and reduced single crystals [66F2]. $\chi_{\text{magng}}$ represents the contribution from the charge carriers; $d\chi_{\text{magng}}$ is obtained by m $\chi_{\text{magng}}$ of reduced crystals and subtracting the "pure" diamagnetic and Van Vleck cont. $N$ = carrier concentration; $T_{\text{deg}}$ = degeneracy temperature; $m^*$ = density-of-state effectives.	Xmagng OT AXmagng · 10-7 cm <sup>3</sup> g <sup>-1</sup>	4 60	+0.037 +0.270 +0.270	-1.016	+1.704	-	he properties	g-factor	£.	1.9788 ± 0.007	1 9780 1 0 007	1.994 ± 0.001	$1.994 \pm 0.001$	2.004 ± 0.001	04 ± 0.001	04 ± 0.001	04 ± 0.001	10001	il 💮	$2.029 \pm 0.001$	
in pur charge ie "pui iy tem	*	~	, x x x x x x x x x x x x x x x x x x x	*	$\Delta \chi_3$		ry of tl		_	1-	1	1.9			2.004	2.004	2.004	2.204		2.05	_
Susceptibility tion from the subtracting the subtracting the	$T_{ m deg}$ $^{\circ}{ m K}$		28 148	1	550		dimma	T	Å	8	300	77	RT	1.9	4.2	11	300	88	70	203	
Susception fro subtra	N at 4.2 °K m <sup>-3</sup>		1024		1026		SrTiO <sub>3</sub> .	2	2115	6		10	1	2)			<u>'                                    </u>	10	10		
SrTiO <sub>3</sub> . contribut stals and tion; T <sub>de</sub>	Nat 4		6 · 10 <sup>24</sup> 7.5 · 10 <sup>26</sup>	ı	$5.3 \cdot 10^{26}$			¥	_	(5)		(5)	į	S				(4)	(5)		
25. Sr the co l crysta ntratio			£ £	ဂ့်	ne		Tab. 26.	S		3/2		3/2	2	<b>7</b> /c					1/2		-
Tab. 25. represents the of reduced cry	Sample		5 h, 1200 °C hydrogen 5 h, 1200 °C hydrogen (carbon boat)	redxidized 18 h, 700 °C, air 27 h 1370 °C i	(carbon boat)			Site		Ti4+		Ti4+	Tit.					Ti4+	 ‡		-
$\Delta \chi_{\text{magng}} \chi_{\text{magng}} N = \text{ca}$	<i>J,</i>	pure	5 h, 1200 °C hy (carbon boat)	air 27 h 1370	(carbon boat)				center	Çr <sup>‡</sup>		Mn4+	Fe8+					Ni2+	Mit or Nigt		

 $D, E, a[10^{-2} \,\mathrm{m}^{-1}]$ 

g-factor

\$

 $^{\mathcal{H}}$ 

H

Liter-	ature	62R3					62R3	62R3	62R2		62R2								62R2		62R2	62R1		_
Ref.		6					6	<b>6</b>											Ç		٣	a (		
HFS	$[nA_{\parallel}, nA_{\perp}[10^{-2}m^{-1}]]$									450		$=530\pm 2$	$ ^{1/4}A_{\perp}  = /20 \pm 5$ $ ^{178}A_{\perp}  = 211 + 5$		ų,				$ ^{161}A_{\parallel}  = 36.2$ $ ^{153}A_{\perp}  = 17.6$					
	I											1/2	5/2						5/2 5/2					
S	0-2 m-1]																	$b_{60}$	6.7 ± 2	$1.1 \pm 2$	$1.4 \pm 0.5$	$1.4 \pm 0.5$	$-0.25 \pm 0.5$	$0.5 \pm 0.3$
FS	$D, E, a [10^{-2} \text{ m}^{-1}]$																FS [10-2 m-1]	240	106.6 ± 2	105.9 ± 2	$-3.2 \pm 0.5$	$-3.24 \pm 0.5$	$-4.8 \pm 0.5$	-5.7 + 0.2
or	8	2 213 + 0 002	2 202 ± 0.001	2.202 \(\pi\) 0.001	Z.184 ± U.UU1	$2.180 \pm 0.002$	$1.118 \pm 0.003$	$2.472 \pm 0.003$	$2.470 \pm 0.005$	$2.470 \pm 0.005$	$2.780 \pm 0.005$			$2.720 \pm 0.005$	$2.720 \pm 0.005$	$2.70 \pm 0.01$		$b_{20}$	-10 ± 4	0	$-362.5\pm0.5$	$-362.5 \pm 0.5$	$-233.6 \pm 0.5$	
g-factor	g.	2 110 1 0 000	2.110 H 0.002	2.130 ± 0.001	$2.1/2 \pm 0.001$	(isotropic)	$3.005 \pm 0.005$		$2.61 \pm 0.01$		$2.11 \pm 0.01$	$2.10 \pm 0.005$		$2.18 \pm 0.01$	$2.17 \pm 0.005$	(2.25)		g (isotropic)	1.99 ± 0.001	1.99 ± 0.001	$1.992 \pm 0.002$	$1.992 \pm 0.002$	$1.992 \pm 0.002$	1.992 + 0.002
I	Å.	,	7.4	07	2	203	4.2	4.2	2		2			50		65			2	300	2	4.2	77	300
2	GHz	- -	2				10	10	16	35	16	35		 16	35	35			16	<u> </u>	16	12, 18		-
,	×	- -	9				<u>(2</u>	(5)	<u> </u>	•	<u>(C)</u>								(8)		(8)			
	S		1/2				1/2	1/2			1/2								7/2		7/2			
12	Site		114+								1								1		Sr <sup>2+</sup>			
Para-	magnetic	Centrer	Nis+				Ce3+	+¢PN			Vb8+								Eu²+		cd*+			

 $\xi = [100]$ ,  $\eta = [010]$ ,  $\zeta = [001]$ . Deviations from spin Hamiltonian (7) is ascribed to a covalent bonding by Müller. However, Aisenberg et al. find a negligible contribution of the covalent bonding. [5941]. Spectrum is due to a double quantum absorption between  $S_x = -1$  and  $S_x = +1$  levels. At least fifteen inequivalent sites are observed.

Three inequivalent spectra are observed with axes parallel to the cubic [100], [010] and [001]. Effects of temperature and pressure on Cr\*+, Fe\*+, Eu\*+, and Gd\*+ spectra. [64R2]. Fe\*\* spectra due to nearest charge compensation. [64K7]. Electric field dependence of Gd\*\* spectra. [66S3].

 $2.352 \pm 0.001$ 

 $2.029 \pm 0.001$ 

2 10

3

Ni1+or Ni3+

203 8 8 3

Tab. 24. SrTiO<sub>3</sub> (ceramics containing Ba or Ca in mol%). Superconductive properties of  $(Ba_xSr_{1-x})TiO_3$  and  $(Ca_xSr_{1-x})TiO_3$  [67S8].  $H_{e1}$  is the point at which the magnetization curve first deviates from linearity;  $H_{e1}(0)$  is the extrapolated value for  $T \to 0$  °K.  $\Theta_c$  = superconducting transition temperature

			_	Farounductii	ig transiti	on temper	ature
% Ba or Ca	10 <sup>25</sup> m <sup>-3</sup>	1	H <sub>c1</sub> (0) Oe	% Ba or Ca	N 10 <sup>25</sup> m <sup>-3</sup>	$\Theta_{c}$	$H_{c1}(0)$ Oe
2.5 (Ba) 2.5 (5.0 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5	2.7 5.8 6.4 1.7 12.0 23.0 6.0 0.3 6.7 7.0 0.05 34.0 0.5 2.3 15.0	0.18 0.30 0.25 0.10 0.17 0.10 0.52 0.23 0.50 0.29 0.22 0.09 0.25 0.27 0.45	2.8 2.8 3.9.	10.0 12.5 2.5 (Ca) 5.0 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 20.0 30.0 30.0	4.2 4.5 5.0 9.2 74.0 8.7 0.2 0.6 33.0 2.0 0.06 <sup>b</sup> ) 9.3 13.0 6.7 0.6	0.25 <0.10 0.32 0.30 <0.06 0.43 <0.06 0.37 <0.07 0.48 <0.06 0.39 0.29 0.50 <0.05	(3.5) a)

## Nr. 1A-7 CdTiO<sub>3</sub>, Cadmium titanate

1a	Camin			
l la		rted by S	MOLENSKII in 1950 to be ferroelectric below 50 ··· 60 °K.	
	KII's findings.	ai. denied	MOLENSKII in 1950 to be ferroelectric below 50 ··· 60 °K. its ferroelectricity but Hegenbarth supported Smolens-	50S7, 50H2, 59H4
Ь	phase	II	I	77114
	state	(F)a)		
	crystal system		orthorhombic <sup>b</sup> )	a)50S7
1	space group		Pc2 <sub>1</sub> n <sup>b</sup> )-C <sub>2</sub> *	b)57K1
	Θ	-223.	212.00	
1	Lattice constants		• t	5057
	is the same as in t	en the ort	8 A, $b = 7.615$ Å, $c = 5.417$ Å at RT. horhombic unit cell and the pseudo-cubic monoclinic cell NaTaO <sub>3</sub> ; see Fig. 21.	57K1
2	Flux method (flux	:: 40 wt%	NaCl + 40 mt9/ NaDO + 20	
3		iciare iff D	Hase 1: Tab 28: Fig. 120	57K1
5a	Dielectric constant	t∶κ = 250	at RT. $x = C/(T - \Omega) \cdot C$	
ь	Effect of $E_{\text{bias}}$ on $x$	c: Fig. 139	$O_{p}/C = 4.5 \cdot 10^4  {}^{\circ}K$	50S7, 50H2

		0						_	1
	Tab. 28. CdTiO <sub>3</sub> .				Positio		ſ	Estimated error	
	reactional coordinates of	Cd	( x:	0 + 0.006	0 - 0.006	$\frac{1}{2} + 0.006$	1 0.000		ı
	atoms in the unit cell	Ca .	{ <b>y</b> :	$\frac{3}{4}$ 0 + 0.016	ł	1	$\frac{1}{2}$ - 0.006	$\pm 0.002$	ı
1	[57K1]		z:	0 + 0.016	0 - 0.016	$\frac{1}{2}$ - 0.016	1 1 0 044		ı
ł			(x)	1 ± 0 005	1 0005	2 0.010	•	$\pm 0.002$	ı
		Ti	{ v:	0	± — 0.005	0 + 0.005	0 - 0.005	±0.005	l
-			\ z:	$\begin{array}{c} \frac{1}{2} + 0.005 \\ 0 \\ 0 - 0.065 \end{array}$	2	1 2	0		
ı						$\frac{1}{2}$ + 0.065	$\frac{1}{2}$ - 0.065	±0.010	
-		0(1)	\ x:	$0 - 0.03$ $\frac{3}{4}$ $\frac{1}{2} + 0.05$	0 + 0.03	$\frac{1}{2} + 0.03$	$\frac{1}{2}$ - 0.03	1	
-		O(1)	\ y:	34	ł	3	1	±0.015	
1			\ z:	$\frac{1}{2}$ + 0.05	$\frac{1}{2}$ - 0.05	0 + 0.05	0 - 0.05	±0.025	
1			( x:	$\frac{1}{4} + 0.05$	$\frac{1}{4}$ - 0.05			± 0.015	
1		O(2)	{ y:	$\frac{1}{4} + 0.05$ $0 - 0.03$ $\frac{1}{4} + 0.06$	0 - 0.03	$\frac{3}{4} - 0.05$	$\frac{3}{4}$ + 0.05	±0.005	
1			\ z:	$\frac{1}{4} + 0.06$	$\frac{3}{4} + 0.06$	$\frac{1}{2} - 0.03$	$\frac{1}{2}$ - 0.03	士 0.015	
ı						$\frac{3}{4} - 0.06$	<del>1</del> — 0.06	士0.015	
L		O(3)	) x:	‡ + 0.05	$\frac{1}{4} - 0.05$	$\frac{3}{4}$ — 0.05	$\frac{3}{4} + 0.05$	±0.005	
L		- (3)	) y.	$\frac{1}{2} + 0.05$ $\frac{1}{2} + 0.07$ $\frac{1}{4} + 0.06$	$\frac{1}{2}$ + 0.07	0 + 0.07	0 + 0.07	±0.003	
	This specimen is not spherical	••		<b>4</b> + 0.06	$\frac{3}{4} + 0.06$	₹ <b>-</b> 0.06			
	This specimen is not spherical	so that	( Z;	‡ + 0.06	$\frac{3}{4} + 0.06$		$\frac{1}{4} - 0.06$	±0.015 +0.015	

a) This specimen is not spherical, so that the value of  $H_{e1}(0)$  quoted is only approximate.

Nr. 1

(Resi

1a

b

b) Hall coefficient appeared to be affected by magnetic history of specimen at liquid helium temperature.

#### Nr. 1A-8 BaTiO<sub>3</sub>, Barium titanate

(Responsible authors for this section are as follows: IKEDA, NAKAMURA, NOMURA, SAWAGUCHI, SHIOZAKI and TOYODA, abbreviated as INANOSASHITO).

						<del></del>	
1a	independen 1945. The f and co-work the cubic-te	tly by WAINE erroelectric ackers in 1944 a etragonal pha	ER and SOLOM ctivity of BaT and by Wul in se transition	on in 1942, by C iO, was reported n 1946. The stru	GAWA in 1944 independentl ctural change	eramic specimens and by Wul in y by von Hippel e associated with rays, by Megaw	42W1, 44O1, 45W1 44V2 46W2 45M1
ь	phase	IVa)	IIIa)	IIÞ)	IÞ)		a)49K2,49R1
]-	state	Fa)	Fa)	Fc)	Pb)		Þ) <i>45M1</i>   °) <i>46V1,46W1</i>
	crystal system	rhombo- hedrala)	ortho- rhombic*)	tetragonal <sup>b</sup> )	cubic <sup>b</sup> )	hexagonal <sup>d</sup> )*	d)55R1
	space group	R3m-C <sub>3</sub> a)	Amm2-C <sub>2</sub> a)	P4mm-C <sub>4▼</sub> <sup>b</sup> )	Pm3m-O <sub>h</sub> b)	C63/mmc-D <sub>6h</sub> d)	
.	$\Theta$	-9	(Oa) 5	(a) 120	9)** 146	60 <sup>d</sup> ) °C	
	$P_{\bullet} \parallel [001]$	in phase III	along [100] of (along [110] o (along [111] o	of phase I).			
	The direction $T_{\text{molt}} = 16$	ons of $P_{\mathbf{s}}$ are ill 18 °C.	llustrated alon	ng with lattice dis		g. 140. attice constants)	51W2
	a = 3.9920	$\dot{A}$ , $c = 4.036$	1 Å at 20 °C.	0 (		·	51R1
	Hexagonal	form: $a_{\text{hex}} = 0.1 \cdot 10^3 \text{ kg}$	: 5.735 Å, c <sub>bex</sub>	= 14.05 Å at R	т.		48B3
2a	Crystal gro	wth: Flux me	ethod (flux K	Fa) or TiO2-rich	melt <sup>b</sup> )).	m:0 41	*)54R1, b)65S8
	solvent).	thod (with li	eded solution mited success)		ue using exc	ess TiO <sub>2</sub> as the	63L3 50V2
ь	For chunk	ms: For butto y type: Fig. 1 onal form: Fig	erfly-type: Fig 43. g. 144.	g. 142.			
3	Crystal str Crystal str Crystal str	ucture of pha ucture of pha ucture of pha	se IV: $Z=1$ .	Tab. 31. . Tab. 32; Fig. 1			
4	Phase I: Phase II: Phase III: Phase IV: Thermal ex	a = 3.996  Å $a = 3.9920  Å$ $a = 3.990  Å$ $a = 4.001  Å$	$\dot{A}$ , $c = 4.0361$ $\dot{b} = 5.669  \dot{A}$ $\dot{\alpha} = 89^{\circ} 51^{\circ}$ $\dot{\alpha} = 148, 149; Ta$	Å at 20 °C. , $c = 5.682$ Å at			47M3 51R1 57S2 57J2
5a	Dielectric of Further da Effect of Phase diag	dispersion: Fi ata from optic o on x: Fig. 10 gram in regard	60, 161, 162. d to φ: Fig. 16 Θ <sub>f</sub> /dE <sub>blas</sub> =	ents: Fig. 201; T			53M2
b	Non-linear $\xi = -5.5$	dielectric pro	operties: Fig. 5, $\zeta = 1.7 \cdot 10$	166. 10 J C <sup>-6</sup> m <sup>9</sup> .			53M2

The transition from the hexagonal form to the cubic one is very sluggish and the hexagonal form can be produced by rapid cooling from above 1460 °C.

50H2,

;7 . **K1** 

7, 50H2

stimated error  $\pm 0.002$ 

 $\pm 0.002$ 

 $\pm \, 0.005$ 

 $\pm 0.010$ 

 $\pm 0.015 \\ \pm 0.025$ 

士0.015

 $\pm 0.005$ 

士0.015

±0.015

±0.005 ±0.015 ±0.015

In most papers this Curie point has been reported to be about 120 °C, but it seems to be about 130 °C for pure BaTiO<sub>3</sub>

b

15

16 17

Tab.

δį

0.0 0.0 0.0 0.0

The O(2)

- 1	Trowned des Perowskit-Typs	
5c	Nr. 1A-8 BaTiO <sub>3</sub> continued	
1 30	Spontaneous polarization: Fig. 167, 168, 169. Coercive field: Fig. 170, 171, 172.  Effect of A on P. P.	
١.	Effect of p off P <sub>8</sub> : Fig. 173.	į
d	Electrocaloric effect: Fig. 174. Pyroelectricity: Fig. 175.	
6a	Specific heat: Fig. 176, 177. Transition heat, transition entropy: Tab. 38.	
b	Thermal conductivity: Fig. 178, 179.	
7a	Piezoelectricity: Tab. 39, 40; Fig. 180 ··· 183.	
b	Electrostriction: Fig. 184, 185.	
8a	Elastic compliances and stiffnesses: Tab. 41. See also Tab. 40. Fig. 186 ··· 193.	
b	Non-linear elastic properties: Fig. 194.	
9a	Refractive indices: Fig. 195, 196, 197. Birefringence: Fig. 198, 199. Reflection and absorption: (i) Far-infrared region. Fig. 200, 201; Tab. 42. (ii) Infrared region. Fig. 202, 203, 204. (iii) Visible region. Fig. 205, 206, 207. (iv) Ultraviolet region. Fig. 208; Tab. 43; Fig. 209, 210, 211. For the effect of E <sub>bis</sub> , on the absorption	
ь	Linear electroontic effect: Fig. 212	67G1
d	433 °K, measured at 6328 Å. $(M_{11} - M_{12}) = (+ 0.13 \pm 0.02) \text{ m}^4 \text{ C}^{-2}$ at 408 ···	. 64G3
- 1	Faraday rotation: Fig. 216; Tab. 44.	
	Non-linear optical properties: Susceptibility for SHG (second harmonic generation) (relative values, see Sec. IC): $d_{15}=35\pm3$ , $d_{31}=37\pm3$ , $d_{33}=14\pm1$ , determined with the Nd-doped CaWO <sub>4</sub> laser beam. Fig. 217.	64M2
	Raman scattering: Fig. 218.	
g	Luminescence: Fig. 219, 220.	
a H	Conductivity of as-grown crystals and ceramics: The data vary from sample to sample depending on the purity and the method of preparation: only representative data are given here. Fig. $221 \cdots 225$ . Conductivity associated with doping or reduction (including PTC (Positive Temperature Coefficient) or resistivity: $d \varrho / d T > 0$ ): Fig. $226 \cdots 230$ . Piezoresistivity: Fig. $231$ , $232$ . For additional data, see	
F	Breakdown strength: Fig. 233, 234. For additional data, see	59S1, 63M1, 67G4
P	thotoconductivity and photoemission: Fig. 235, 236. ther transport properties: In <i>n</i> -type single-domain crystals, the electron mobility is 1.26 °C representation of the result of the	58I 3, 59F1, 64K3, 64U1
4	$\mu_{c} \sim 0.13 \cdot 10^{-4}  \text{m}^{2}  \text{V}^{-1}  \text{co}^{-1}  \text{J}^{-1}$	67B2
In	In n-type single-domain crystals, the energy separation ( $\Delta u = 10^{-2} \cdots 10^{-1} \text{ eV}$ ) as been estimated vs. $T$ .  In n-type single-domain crystals, the energy separation ( $\Delta u = 10^{-2} \cdots 10^{-1} \text{ eV}$ ) as been estimated vs. $T$ .	67B2
Da ha Se	are available on the Hall coefficient and conductivity of single domain crystals at a are available on the Hall coefficient and conductivity of single domain crystals ebeck-effect: Fig. 238. $N = 8.5 \cdot 10^{24} \mathrm{m}^{-3}$ and of $N = 2.5 \cdot 10^{23} \mathrm{m}^{-3}$ . Fig. 237.	67B2 67B2
ES	FR: Tab. 46; Fig. 239 ··· 243.	
1	ı	1
	ssbauer effect: Fig. 244 ··· 247.	

14a	Domain structure: Domains have been observed by various methods: polarized light*), X-rays <sup>b</sup> ), electron microscope <sup>c</sup> ), etching method <sup>d</sup> ), powder pattern method <sup>e</sup> ), and decoration method <sup>f</sup> ). Fig. 252 ··· 255.	a)48M1, 49F1,52M3 b)63B13, 64N1,65C3, 64L1 e)62T1,63B9, 67R4,64T2, 66R5,67R2 d)55H2 e)59P1 f)66S8
ь	Domain wall motion: Domain wall motion has been observed optically*) and by repeated differential etching.*) The domain shapes in motion depend on the applied field and temperature.*) Fig. 256.  The wall velocity is proportional to $\exp(-\delta/E)$ at relatively low field. $\delta = \arctan$ tion field for domain wall motion. Fig. 257 ··· 267.	a)59M2,60S2 b)63S13 c)63S13 58M4,59M3
15	Surface layer: The first suggestion about the existence of surface layers of BaTiO <sub>3</sub> crystals was made by Känzig <sup>3</sup> ) on the basis of electron diffraction studies of very small particles of BaTiO <sub>3</sub> <sup>b</sup> ). The dependence of the following quantities on the thickness of the crystals has been observed as evidence of the existence of surface layers: domain wall velocity <sup>c</sup> ), dielectric constant <sup>d</sup> ), optical absorption coefficient <sup>e</sup> ) and electroluminescence spectra <sup>f</sup> ). Pyroelectric current was observed above the Curie point and discussed in connection with surface layers <sup>g</sup> ). A few models of surface layers have been proposed <sup>h</sup> ). According to Tanaka and Honjō <sup>i</sup> ), the surface layer, if it exists, seems to be very thin.	a)55K1 b)54A1 c)56M4, 61M2, 65C1 d)61S4, 62C3 e)60C3 f)58H1, 65B7, 66B6 e)56C1 h)56M4, 61F2, 59D3, 65C1 l)64T2
16	Radiation damage: Fig. 268, 269.	
17	Energy band structure: Fig. 270.	

Tab. 29. BaTiO<sub>3</sub>. Solubility in KF solution. [54K1]

$\frac{1}{T}$	1000	1050	1100	1150	1200	1250	1300	°C
BaTiO.	4	6	9	12.5	17	22.5	28.5	mole %

Tab. 30. BaTiO<sub>3</sub>. Fractional coordinates of atoms in the unit cell of phase I. [52M2]

	х	у	z
Ba	0	0	0
Ti	1/2	1 1	1 2 0
O	1/2	$\begin{array}{c c} \frac{1}{2} \\ \frac{1}{2} \\ 0 \end{array}$	0
	1 2	0	1/2
	0	1	1 2

Tab. 31. BaTiO<sub>3</sub>. Shift of atoms in fractional coordinates of phase II from the positions of phase I. [51K1], [55F1], [61E3]

$\delta z_{ m Ti}$	$\delta z_{\mathrm{O}(1)}$	δz <sub>O(2)</sub>	Ba B <sub>11</sub> B <sub>33</sub>	Ti B <sub>11</sub> B <sub>33</sub>	O(1) B <sub>11</sub> B <sub>22</sub>	O(2) B <sub>11</sub> B <sub>22</sub>	B <sub>33</sub>	References
0.014 0.014 0.015 0.012	$ \begin{array}{r} -0.032 \\ -0.023 \\ -0.024 \\ -0.026 \end{array} $	$ \begin{array}{r} 0 \\ -0.014 \\ -0.020 \\ 0 \end{array} $	0.48 0.273 0.27 0.28 0.27 0.28	0.13 0.152 0.53 0.21 0.46 0.30	0.13 0.334 0.90 0.08 0.90 0.50	0.48 0.267 0.60 0.49 0.60 0.90	0.07 0.90	51K1 55F1 61E3 61E3

The positions of atoms in the unit cell are Ba at (0, 0, 0), Ti at  $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2} + \delta z_{Ti})$ , O(1) at  $(\frac{1}{2}, \frac{1}{2}, \delta z_{O(1)})$  and O(2) at  $(\frac{1}{2}, 0, \frac{1}{2} + \delta z_{O(2)})$ .

Tab. 32. BaTiO<sub>3</sub>. Fractional coordinates of atoms in the unit cell of phase III. [57S2]

			[5702]
	x	y	z
Ba	0	0	0
Ti	0	1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$\frac{1}{2}$ $\frac{1}{2} + \delta z_{\text{Ti}}$
O(1)	1 1 2 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$\frac{\frac{1}{2}}{0}$	$\frac{\delta z_{\text{Ti}}}{\frac{1}{2} + \delta z_{\text{O(1)}}}$
O(2)	0 1 2 2 2 2 2 2 2	$ \frac{1}{2} + \delta y_{O(2)}  \frac{3}{4} + \delta y_{O(2)}  \frac{3}{4} - \delta y_{O(2)} $	$\frac{\delta z_{\rm O(1)}}{\frac{1}{4} + \delta z_{\rm O(2)}}$
	1	$\frac{1}{4} - \delta y_{O(2)}$	$\frac{1}{4} + \delta z_{O(2)} \\ \frac{3}{4} + \delta z_{O(2)}$

 $\delta z_{\text{Ti}} = +0.010$ ;  $\delta z_{0(1)} = -0.010$ ;  $\delta z_{0(2)} = -0.013$ ;  $\delta y_{0(2)} = +0.003$ .

Tab. 33. BaTiO<sub>3</sub>. Comparison of atomic shifts in phase III and phase II with respect to different origins. The coordinate of atoms of [55F1] and [57S2] are used for phase II and III, respectively. [57S2]

	Orthorhombic	Tetragonal
$ \delta z \begin{cases} \text{Ti} \\ \text{O(1)} \\ \text{O(2)} \end{cases} $ $ \delta y_{\text{O(2)}} $	Ba at (000) +0.06 Å -0.06 Å -0.07 Å ±0.02 Å	+0.06 Å -0.09 Å -0.06 Å

Origin is chosen to give  $\delta z_{0(2)} = 0$ +0.13 Å+0.15 Å $+0.07 \, \text{\AA}$ +0.09 Å $+0.02 \, \text{\AA}$ -0.03 Å

Tab. 34. BaTiO<sub>3</sub>. Fractional coordinates of atoms in the unit cell of hexagonal structure. [48B3]

2Ba(1) at (b),  
4Ba(2) at (f), 
$$z = 0.097$$
,  
2Ti(1) at (a),  
4Ti(2) at (f),  $z = 0.845$ ,  
6O(1) at (h),  $x = 0.522$ ,  
12O(2) at (k),  $x = 0.836$ ,  $z = 0.076$ 

Tab. 35. BaTiO<sub>3</sub>. Interatomic distances of hexagonal structure. [48B3]

in the Ti<sub>2</sub>O<sub>9</sub> group

O(1) - O(1) = 2.49 Åin the shared face.

in the same layer but the atoms do not belong to the same shared face. = 3.25 ÅO(2) - O(2) = 2.91 Å

O(1) - O(2) = 2.91 Å

Ti(2) - O(1) = 1.96 Å

Ti(2) - O(2) = 2.02 Å

in the TiO<sub>6</sub> octahedra

O(2) - O(2) = 2.82 Åin the same layer.

O(2) - O(2) = 2.69 Åbetween adjacent layers. Ti(1) - O(2) = 1.95 Å

Tab. 36. BaTiO<sub>3</sub>. Lattice constants and unit cell Tab. 37. BaTiO<sub>3</sub>. Linear thermal expansion coeffi-

		various 1	· [21K1]	
<i>T</i>	a Å	b Å	c Å	V Å3
+ 20 + 4	3.9920 3.9910	3.9920 3.9911	4.0361 4.0357	64.317 64.282
Θ <sub>111-11</sub> + 4 - 99	4.0185	3.9860 3.9750	4.0162 4.0150	64.319 64.093
Θ <sub>IV-III</sub> - 99 -160	4.0015   3.9996	4.0015   3.9996	4.0020 3.9997	64.079 63.981
Accuracy	of measurem	ent below	RT was ±	0.0007Å,

cients along a, b, and c axes. [51R1]

			11,1
T	α <sub>α</sub>	α <sub>b</sub>	α <sub>c</sub>
°C	10 <sup>-6</sup> °C <sup>-1</sup>	10 <sup>-6</sup> °C <sup>-1</sup>	10-6 °C-1
$+20 \cdots + 4$	15.7	15.7	6.2
$+ 4 \cdots - 99$	4.9	28.4	-0.9
$-99 \cdots -160$	7.8	7.8	8.2

Tab. 38. BaTiO<sub>3</sub>. Transition heats and transition entropies

Transition	$\Delta Q_{\mathbf{m}}$ cal mol <sup>-1</sup>	$\Delta S_{\rm m}$ cal mol <sup>-1</sup> °K <sup>-1</sup>	References
$II \rightarrow II$ $III \rightarrow II$	$ \begin{vmatrix} 8 \pm 2 \\ 14.3 \\ 12 \end{vmatrix} $ $ \begin{vmatrix} 22 \pm 4 \\ 15.5 \\ 16 \end{vmatrix} $ $ 50 \pm 5 \\ 47 \\ 47 \end{vmatrix} $	0.04 0.07 0.06 0.076 0.054 0.058 0.125 0.12	52S5 52V1 52T1 52S5 52V1 52T1 52S5 52V1 48B1

.c ;t is []

3*3*]

ace.

n coeffi-

6.2 --0.9 8.2

transition

eferences

52S5 52V1 52T1 52S5 52V1 52T1 52S5 52V1 48B1

		References	2003	58B2 59H7	51B1 56B3	6461	xcept for	S.E. See	m² N-1	2.38 21.7	2.45 21.3	-2.40 20.79 -2.58 22.7 -2.64 23.64		SE SE	-	22.2   17.1		CLA Cas	-	58.5 45	
:	_  -	<sup>//33</sup> C	6	7 52	<u> </u>	15.6   25	(at 25 °C, except for	SII	10-12 m	8.47 -2	8.20	90.09		S.P. S		-1.9		CE	-	51	
		108 N C-1			3.5	3.9	constants (	k <sub>n</sub>	_		0.33		0.19	SE .	m <sup>2</sup> N <sup>-1</sup>	-2.7		CD 113	-	62	
	no	e33 h16	-			17.5   11.5	electromechanical and elastic constants $t_{ m J}$	Å.,	3		0.48		0.34	S <sub>12</sub>	10 <sup>-12</sup> m	-2.9	-2.4	$c_{13}^{E}$		67.5	
	omechanica	631 6	-		4 4	_4.35   1	echanical a	, k	10		0.194		0.113	SB3		7.0	7.15	$c_{12}^D$	10° N m-2	70	
	d electr	615	-			4.11	electrom ]	ķ	97		0.48		0.30	SES		9.1	8.1	$c_{12}^E$		69	
	tants an	Ap -				0.36	lectric, e ). [ <i>66b1</i>	833			14.1		15.0 18	d.		8.3	7.7	c <sub>B</sub> 2		177	٠
	ctric cons	1 k33	-	15 0.560		08 0.493 12 0.50	Dielectric, piezoelectric,	831	-3 m <sup>2</sup> C-1		-5.5		5.0 7.3	688		13.5		$c_{33}^{R}$		150	
		k 15 k 31	-	0.570 0.315		0.48 0.212	_	g <sub>15</sub>	10-3		21.0			631	C m -2	-3.1		ch.		159	
	al and ceramic).	833	-1-5	57.6	;	$\begin{vmatrix} 7 & 11.4 \\ 2 & 12.6 \end{vmatrix}$	commercial). Ca	d33		130 ···	160 135 149	118 105 129	115 80 90 90	615		10.9		CE CIL		158	
	crystal an	~  '	10-3 m <sup>2</sup>	5.3   -23.1		$\begin{array}{c c} 18.8 & - 4. \\ 20.2 & - 5. \\ \end{array}$	д,	d <sub>31</sub>	10-12 CN-1	-56		- 38 - 53	1 20 20 35 35 35 35 35 35 35 35 35 35 35 35 35	0	ທຣິ X	910	395	hss		16.7	o, USA.
	BaTiO <sub>3</sub> (single cryst	d <sub>33</sub> 8	_	132 85.6 1	9	191 190 2	in and m	$d_{15}$	=		242		٠.	,	o:I	1000		h <sub>81</sub>	108 N C-1	-3.8	veland, Ohi
		d <sub>31</sub>	10-12 CN-1	- 57.7 - 34.5	- 33.3 - 103.3		eramic, pla	,	-×	1350	1700 1380 1200	910 1000 1180	800 600 600 600 600		- <sup>11</sup>	1300		h <sub>15</sub>		12.3	poration, Cle
	Tab. 39.	d <sub>18</sub>	-	single crystal		mic 270	Tab. 40. BaTiO <sub>s</sub> (ceramic, plain and modifie		Composition	City	b.g.TiOs	og Day Barrell	Ca. 08 Pb. 04 Ba. 10 I.O. Ca. 08 Pb. 08 Ba. 10 I.O. Ca. 08 Pb. 08 Ba. 10 I.O. Ca. 08 Pb. 01 Ba. 10 I.O. Ca. 08 Pb. 01 Ba. 10 I.O. Ca. 08 Pb. 01 Ba. 10 I.O.	.12 F D <sub>0.08</sub> D <sub>0.00</sub> + 10.3		.Ba. TiO.	(ceramics B)*)	00:0 71:00 480.	1	Cao os Bao ss TiO s (ceramics B) a)	a) Trade Mark: Clevite Corporation, Cleveland, Ohio, USA.
				eino	SIIIR	ceramic				_ \		aShiTo	ૺૺઌ૽ઌ૿ઌ૿	3		8	ر خ ا ا			్రే	(a)

Ref.

A, B [10-2 m-1]

FS D, E, a, F, b [10<sup>-2</sup> m<sup>-1</sup>]

 ${}^{r_{X}}$ 

 $_{\rm GHz}^{\nu}$ 

×

S

		11 1 (	Oxide des Perow	skit-Ty	ps			
References	50C2 51B1 58B2 56B3 64b1	6661, 58B2 51B1	56B3 64b1 55H5			Ref. Liter- ature a) 6011	b) 6301 0) 6415	(66131)2)
BaTiO <sub>s</sub> (single crystal and ceramics). Elastic constants. $[66bI]$ s <sub>8</sub> s <sub>8</sub> s <sub>1</sub> s <sub>2</sub> s <sub>1</sub> s <sub>2</sub> s <sub>3</sub> s <sub>4</sub> s <sub>4</sub> s <sub>6</sub> s <sub>6</sub> references	26 18.4 12.4 8.84 RT 55 23.3 18.3 22.3 25 5 22.8 17.5 23.6 25	8.1 179.0 186.5 151.6 141.6 54.34 80.64 113.1 25 6661, 76.6 78.2 77.5 71.0 42.9 54.6	66 68 66 57 44.8 25 44.8 25 42.48 53.02 45.65 25 Tab. 42 ··· 45 see page 58	Summary of the ESR parameters for various normandical.	-	$D, E, a, F [10^{-2} \text{ m}^{-1}] \qquad I \qquad A, B [10^{-8} \text{ m}^{-1}] \qquad \text{Ref.}$ $D = 56 \pm 5 \qquad 5/2  \frac{65}{64} \frac{1}{10} = \frac{46}{79} \frac{1}{8} + 0.5 \qquad \text{a})$	$= 78.6 \pm 0.5$ $= 79 \pm 0.5$ $= -(774 \pm 0.6)$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
ab. 41.		17	180		۲å	78	440 RT	438
T S S S S S S S S S S S S S S S S S S S	15.7 8.93 9.5 0.5	164.9		BaTiO3.	, GHz	9.3	9.3	
S. B.	7.25 8.18 8.7 cR	282.6 206 168 150		Tab. 46.	¥	(7)	(2)	
S.E. 9.26	8.05 8.05 9.1 ch	275.1 166 150	165.6	I	S	-   5/2	+ 5/2	
	ceramics	single crystal	_	ţ	Para- magnetic Site center	Mn²+ Ti⁴+	Ba*+	

								1 1 1	reic				F -					
Liter-	ature	59H5, 62R1	63522)				64532)3)	67Z2		62R1		64T1	6ET3		66521	63512	63S11, 66T2, 67T3	· · · · · · · · · · · · · · · · · · ·
7,0	Rei.	đ)	6	<u>د</u>													( <del>)</del>	6353), [6
HFS	$I = A, B [10^{-2} \text{ m}^{-1}]$	·			,			$\frac{7/2}{^{69}A_{\parallel}} = ^{69}A_{\perp}$ $^{69}A_{\parallel} = 109$							$1/2$ $^{196}A = 0 \pm 5$ $^{196}B = 135 \pm 5$	$^{196}A < 28$ $^{196}B = 135 \pm 10$		Temperature dependence of $D^{4}$ in the tetragonal phase is linear. $[65V4]$ . Forbidden transition lines $(\Delta M = \pm 1, \Delta
	n-1]		E=0			E=0			$p_{\mathbf{e}_0}$	$1.6 \pm 1.0$	-	$-3.7 \pm 2.8$	$-1.8\pm0.4$					$\pm 1, \Delta m = \pm$ and from tetra
FS	$a, F, b [10^{-2} \mathrm{m}^{-1}]$	± 12	9 ± 20	$-530 \pm 10 + 105 \pm 20$	$^{0}_{1.3}^{\pm}$ 10	0 +115 ± 10	$3 \pm 5 + 113 \pm 10$		b <sub>40</sub>	$+4.0 \pm 1.0$	>≈6	$24 \pm 0.9$	$23.3 \pm 0.4$		13			on lines (AM == ttragonal phase crystal.
	D, E, a	$D = 0$ $a = 102 \pm 12$	$D = +929$ $a = +91 \pm$	D = -53 $a = +10$	$D = -640 \pm E = 0 \pm 1.3$	D = 0 $a = +11$	D = -23 $a - F = +$		b 20	$-293.6 \pm 1.0$		1		g.	$2.459 \pm 0.003$	$2.51 \pm 0.02$	1.911	orbidden transiti from cubic to te ase. [64SJ]. 5GJ]. Ba²+ in a single
	g-factor	2.003	2.0036 ± 0.002	2.0036 ± 0.002	2.0036 ± 0.002	2.0036 ± 0.002	2.003 ± 0.002	4.347 (isotropic)		1.995 ± 0.003	$1.995 \pm 0.003$	1.992	1.992	8	$1.950 \pm 0.005$	1.935 ± 0.005	1.930	Temperature dependence of $D^{s}$ in the tetragonal phase is linear. [65V4]. Forbidden transition lines ( $\Delta M = \pm 1, \Delta m = \pm 1$ ) are observed. [6301], [64I5]. Forbidden transition lines ( $\Delta M = \pm 1, \Delta m = \pm 1$ ) are observed. [6301], [64I5]. Forbidden transition lines ( $\Delta M = \pm 1, \Delta m = \pm 1$ ) are observed in the reperature from cubic to tetragonal phase. Forbidden transition lines ( $\Delta M = 2, 3, 4, 5$ ) are observed in the rhombohedral phase. [6453]. Fet spectra due to the oxygen vacancy; $g_{\parallel} \approx 2, g_{\perp} = 6.0 \pm 0.1$ at 77 °K. [6561]. Hyperfine structure of an electron captured by an oxygen vacancy. [64D1]. Mnt* ion takes the place of Ti* lattice site in ceramics, while it takes the place of Bat* in a single crystal. Positive at a sassumed.
F	å Ä	393, ;	300	276	213	77	173	4		300	425	RT	436		4	78	55	ase is line are observible near triple served in $g = 6.0$ oxygen values, whill mics, mic
v	GHz	5 7.5, 10, 16.3	10	<u>I.</u>	<u>1                                    </u>	!	1	6		12, 18	<u> </u>	10	l <u> </u>		10		10	Temperature dependence of $D^{1}$ in the tetragonal phase Forbidden transition lines $(JM = \pm 1, Jm = \pm 1)$ are of Temperature dependence of $^{10}A$ . [672], Feb* spectra are studied with a d.c. bias electric field $^{10}$ Forbidden transition lines $(JM = 2, 3, 4, 5)$ are observed. Feb* spectra due to the oxygen vacancy; $g_{\parallel} \cong 2, g_{\perp}$ . Hyperfine structure of an electron captured by an oxygen with the place of Ti* lattice site in ceramics Positive a is assumed.
	K	(2)						(3)		(8)					(3)		(2)	in the $I = \pm 1$ $I = \pm 1$ $I = \pm 1$ I = 2, and $I = 2$ , where $I = 2$ , and
	S	5/2						1/2		7/2					1/2		1/2	ce of $D$ ; wes $(\Delta M)$ ce of $B_{s_{s_{s_{s_{s_{s_{s_{s_{s_{s_{s_{s_{s_$
	Site	Ti4+						Ti4+		Ba2+		Ti4+			Ti4+		oxygen	dependentusition lindependentusition lindependentusition lindependentusition lindue to the ucture of as the plax massimed.
Para-	magnetic	Fe3+						Co2+		Gd <sup>3+</sup>					Pt3+		Electron	a) Temperature dependence of $D^s$ in the tetragonal phase is linear. $[65V4]$ b) Forbidden transition lines $(\Delta M = \pm 1, \Delta m = \pm 1)$ are observed. $[63O1]$ , c) Temperature dependence of $M_{\bullet}$ . $[67Z]$ . d) Fe³* spectra are studied with a d.c. bias electric field near transition te o) Forbidden transition lines $(\Delta M = 2, 3, 4, 5)$ are observed in the rhombof $f$ Fe³* spectra due to the oxygen vacancy; $g_{\parallel} \cong 2, g_{\perp} = 6.0 \pm 0.1$ at $g$ Hyperfine structure of an electron captured by an oxygen vacancy. $[64]$ mh³* ion takes the place of Ti⁴* lattice site in ceramics, while it takes $f$ 9 Positive $a$ is assumed.

 $^{66}A_{\parallel} = ^{66}A_{\perp}$  $^{56}A_{\parallel} = -(79.3 \pm 0.4)$ 

0

D = 0 $a = +(12.11 \pm 0.94)$ 

± 0.001

2.002

438

Tab. 42. BaTiO<sub>3</sub>, SrTiO<sub>3</sub>, TiO<sub>2</sub>, KTaO<sub>3</sub>. Dispersion parameters calculated from the Kramers-Kronig analysis [62S11]. See Fig. 201

f	_ analysis [02311]. S	ee Fig. 201	me Hamers-Kronig
$\kappa' = \kappa_{\infty} + \sum_{i} 4\pi \varrho_{i} v^{2} \frac{1}{(v_{i}^{2} - v_{i}^{2} - v_{i}^{2})^{2}}$	$v_i^2 - v^2$	0	- 1
$i \qquad (v_i^2 -$	$-v^2)^2 + \overline{\gamma_i^2 v^2}$	$x'' = \sum 4\pi \varrho_i \nu_i^2$	$\gamma_i \nu$
BaTiO <sub>3</sub> Ordinary ray	SrTiO <sub>3</sub>	TiO.	$\frac{\gamma_{i} \nu}{(\nu_{i}^{2} - \nu^{2})^{2} + \gamma_{i}^{2} \nu^{2}}$
$\lambda_1; \nu_1$ 20.4: 491	10.4	Ordinary ray	KTaO <sub>3</sub>
$ \begin{vmatrix} \gamma_1/\nu_1 \\ 4\pi\varrho_1 \end{vmatrix} = 0.059 \pm 0.002 \\ 0.60 \pm 0.03 $	$\begin{array}{c} 18.4; 544 \\ 0.049 \pm 0.002 \\ 1.56 \pm 0.06 \end{array}$	$\begin{array}{c} 20.0; 500 \\ 0.044 \pm 0.004 \\ 2.0 \pm 0.2 \end{array}$	18.2 ± 0.2; 549 ± 6 0.043 ± 0.009
$ \begin{vmatrix} \lambda_2; \nu_2 \\ \nu_2/\nu_2 \\ 4\pi \varrho_2 \end{vmatrix}                                  $	$\begin{array}{c} 56.3 \pm 0.5; \ 178 \pm 2.0 \\ 0.039 \pm 0.004 \end{array}$	$\begin{array}{c} 2.0 \pm 0.2 \\ 25.8; 388 \\ 0.058 \pm 0.006 \end{array}$	2.4 ± 0.5 49.8: 200 8
$\lambda_3; \nu_3$ 296 ± 8; 33.8 + 0.9	$3.6 \pm 0.4$ $114.3 \pm 1.1$ ; $87.7 + 0.9$	$1.08 \pm 0.1$	$0.055 \pm 0.011$ $7.6 \pm 1.5$
$\frac{\gamma_3/\nu_3}{4\pi\varrho_3}$ $\frac{2.5 \pm 0.1}{1830 \pm 70}$ Resonance wavelength $\lambda_i$ in $10^{-6}$ m	$0.5 \pm 0.1$ 311 + 62	$54.8 \pm 0.5$ ; $183 \pm 1.8$ $0.19 \pm 0.01$ $81.5 \pm 4.1$	$ \begin{array}{c c} 107.5 \pm 2.0; 93.0 \pm 2.0 \\ 0.5 \pm 0.1 \\ 163 \pm 33 \end{array} $

Resonance wavelength  $\lambda_i$  in  $10^{-6}$  m; resonance frequency  $\nu_i$  in  $10^2$  m<sup>-1</sup>; width  $\gamma_i$ ; strength  $4\pi \varrho_i$ .

Tab. 43. BaTiO<sub>3</sub>, SrTiO<sub>3</sub>, TiO<sub>2</sub>. Energies of fundamental absorption edges (in eV) at RT. [65C2]

				at	17.1.	[0302]			-	-800	(
C. TiO	$E_0$	A 1	A 2	$A_3$	$B_{1}$	B <sub>2</sub>	C <sub>1</sub>	C,	D	F	<del></del>
$\begin{array}{c} \text{SrTiO}_{3} \\ \text{BaTiO}_{3} \\ \text{TiO}_{2} \\ (E \perp c) \end{array}$	3.2 3.2	4.00 3.91 3.97	4.86 4.85 5.52	5.5	6.52 6.10 6.50	7.4 7.25 7.64	9.2 10.3 8.53	9.9 11.8 9.24	12.5 12.8 11	15.3 15 14.1	eV eV eV
BaTiO. S	rTiO	KT <sub>2</sub> O	IZT				i ,				•

Tab. 44. BaTiO<sub>3</sub>, SrTiO<sub>3</sub>, KTaO<sub>3</sub>, KTaO<sub>3</sub>, KTa<sub>0.35</sub> Nb<sub>0.65</sub>O<sub>3</sub> (KTN), TiO<sub>2</sub>. Band gap energies  $\hbar \omega_g$  (in eV). [67B1]. See Fig. 46, 103, 216, 430.  $F_1$ ,  $F_2$ : different dispersion functions  $F_i(\omega/\omega_g)$ , see [67B1]

		1, 1 2	. differen	dispersion	on function	ons $F_i(\omega/c)$	$v_n$ ), see [	67R1
		CiO <sub>3</sub>	BaTiO <sub>3</sub>	KT	aO,	KTN		,07 <i>D</i> 1
	296 °K	77 °K	403 °K	296 °K			TiO <sub>2</sub>	1
Faraday rotation		1	105 1	296 K	77 °K	296 °K	296 °K	
$\hbar \omega_{g}$ for $F_{1}$ Faraday rotation	3.40	3.43	3.25	3.77	3.79	3.54	3.62	
$\hbar \omega_{\mathbf{g}}$ for $F_2$ Energy of reflectivity peak or shoulder	3.21	3.26	3.11	3.62	3.65	3.36	3.37	eV eV
Energy of electroreflectance singularity	3.20	-	3.20		-	3.70	_	eV
we from absorption data	_	-	3.20	3.57 3.80	_	3.60	3.00	eV
Energy at which absorption coefficient $\alpha \approx 10^4 \text{ cm}^{-1}$	3.40	- 1	- 1	3.75	_		3.30	eV eV
occincient α ≈ 10° cm <sup>-1</sup>	3.37	-	3.26	3.79	- 1	3.45	3.18	eV

Tab. 45. BaTiO<sub>3</sub> (reduced or doped). List of reference papers on PTC anomaly

Materials (dopants)	References	Materials (dopants)	References
Single crystal BaTiO <sub>3</sub> : reduced BaTiO <sub>3</sub> : Nb	57H1, 63K3, 64I4, 64G4, 65M1, 65U2 64B11	Ceramics BaTiO <sub>3</sub> : La  BaTiO <sub>3</sub> : Ce BaTiO <sub>3</sub> : Sm BaTiO <sub>5</sub> : Sm BaTiO <sub>5</sub> : Gd BaTiO <sub>5</sub> : Sb (Ba-Sr)TiO <sub>3</sub> : La BaTiO <sub>5</sub> : Sr, Ce, Sn BaTiO <sub>5</sub> : Sr, Ca, Sn BaTiO <sub>5</sub> : Sr, Ca, Sn BaTiO <sub>5</sub> : Sr, Ce	63H5, 65U2 59S1, 63T3, 64J1 63M1 63M3 63G5 65U2 65A3 61H5, 65A3 59S1, 61T1, 63T3 61S1 63T3 61S1 63T3 61S1

Cı Cı C: P 3 T E 4 D 5a aı C. S Δ 1 T P 7a В 9a F E 12b 14a Γ 16

Fi Si pl st

sr Ø

ра —

T:

\* Phase

Cronig
3 11 0 ± 2.0
h 4πεί.  (in eV).  : [67Β1]
2 eV 7 eV
eV   eV   eV   eV   eV   eV   eV   eV

1a	Ferroelectric activity was reported independently by Shirane et al. and by Smolenskii in 1950.							
ь	SMOLENSE phase							
-	state			Fa)	Pa)		b)55K3	
-	crystal sy	stem		tetragonal <sup>c</sup> )	cubic*)		c)46M2	
-	space groi			P4mm-C <sub>4v</sub>	Pm3m-Oh			
ŀ	9	<u> </u>	-1	00°) 49	(0a) °C			
	a = 3.904	$_{5}$ Å, $c=4$	.152 <sub>4</sub> Å a	t RT (in phase I	Ι).		46M2	
2a	Crystal gr	owth: KF	flux met	hod; PbCl <sub>2</sub> flux	method.		58K1,5	52N2
ь	Crystal fo							
3	Crystal st Projection	ructure: I n of crysta	Positional al structu	parameters: Tal re: Fig. 272, 273.	o. 47, 48.			
4	Thermal of Depender	expansion ace of latt	: Fig. 274 ice param	··· 280. eters on hydrost	atic pressure: Fig. 281.			
5a	Dielectric constants: Fig. 282. Small dielectric anomaly was observed at about $-100$ and $-150$ °C. Curie-Weiss constant: $C = 1.1 \cdot 10^5$ °K (single crystal).							
6a	Specific h	eat: Fig.	283.		,			
	•	II-I	1			•		•
	$\Delta Q_{\mathbf{m}}$	1150	cal mol	-1			5157	
	△S <sub>m</sub>	1.6	cal °K-	-1 mol-1			5157	
С	Thermal	conductiv	ity: Fig. 2	284.				
7a	Piezoelec	tric prope	rties: Tal	o. 49.				
9a	Birefringence: Fig. 285. Infrared absorption: Fig. 286, 287. Frequencies of infrared modes: Tab. 50.							
12b	ESR: Ta	b. 51.						
14a	Domain structures were observed by polarized light.  52 59							58K1

Tab. 47. PbTiO<sub>3</sub>. Positional parameters of atoms at RT. [56S5]

i	x	У	Z
Pb	0	0	0
Ti	1/2	1/2	0.540
O(1)	1/2	1	0.112
O(2)	1 2	0	0.612
	Ō	1 2	0.612

Tab. 48. PbTiO<sub>3</sub>. Bond lengths in Å at RT (phase II) and at 490 °C (phase I) [56S5]. O(1)<sub>+</sub> represents the O(1) ion closer to, O(1)<sub>-</sub> that further away from Ti. Similarly O(2)<sub>+</sub> is closer to Pb

phase	II (at RT)	I (at 490 °C)
Ti-O(1)+	1.78	1.89
Ti-O(1)_	2.38	
Ti-O(2)	1.98	1
Pb-O(1)	2.80	2.80
Pb-O(2)+	2.53	
Pb-O(2)_	3.20	

Phase transition II-III was reported to occur only if the cooling rate is extremely slow. [55K3]

Tab.	49. PbTiO <sub>3</sub> nics).Electro	(mod	dified
ical	constants [68U1]	at	RT.

Additive	PbNb <sub>4/5</sub> O <sub>3</sub> 5.0 mol%	BiZn <sub>1/2</sub> Ti <sub>1/2</sub> O <sub>3</sub> 5.0 mol%	Bi <sub>2/3</sub> Zn <sub>1/3</sub> Nb <sub>2/3</sub> O <sub>3</sub> 5.0 mol%	
а	3.915	3.904	3.911	À
C	4.104	4.148	4.133	Å
c/a	1.049	1.062	1.057	A
Q	7.19	7.68	7.12	103 1
porosity	0.105	0.036	0.10	103 kg m-3
Θ	466	524	494	°C
κŢ,	_	195	244	
κ <mark>Τ</mark>	226	147	203	
l <sub>31</sub>	10	3.9	7.4	10-12 0 27
133	37	37	47	10 <sup>-12</sup> C N <sup>-1</sup>
31	5.2	3.0	4.1	
33	16	28	28	10 <sup>-3</sup> m <sup>2</sup> C <sup>-1</sup>
E	1.2	1.2	·	10 <sup>-3</sup> m <sup>2</sup> C <sup>-1</sup>
E	1.1	0.95	1.1	10 <sup>-11</sup> m <sup>2</sup> N <sup>-1</sup>
mech		0.93	1.1	10-11 m <sup>2</sup> N-1
or s <sub>11</sub>	336	54	204	
or s <sub>33</sub>	71	74	326	
15			76	
1	0.068	0.40	0.36	
3	0.008	0.031	0.052	
3	0.23	0.32	0.35	

Nr. 1

Nr.

**Nr.** 1a

b

2a

Tab. 50. PbTiO<sub>3</sub>. Wave numbers in 10<sup>2</sup> m<sup>-1</sup> and symmetries of infrared modes of lattice vibration obtained from Kramers-Kronig analysis of the reflectance data at RT. [65P4]

(Ti-O stretch)	$\widetilde{v}_2$ (Ti-O <sub>3</sub> torsion)	(O-Ti-O bend)	(cation-TiO <sub>3</sub> lattice mode)
530 $(E_u, A_1)$	400 $(B_1, E_u)$	$\frac{220}{172} (E_u, A_1)$	83 (E <sub>u</sub> , A <sub>1</sub> )

Tab. 51. PbTiO<sub>3</sub>. g-factors at RT. [64G1]

			3.	8 1400	ors at	K1. [04G/]	
Paramagnetic center	Site	S	ж	ν GHz	$_{ m ^{o}K}^{T}$	g-fac	ctor
- I		1		GIIZ		gu	g
Fe³+	Ti <sup>4+</sup>	1/2*	(2)	8.8	RT	$2.009 \pm 0.005$	5.97 + 0.02

The spectrum up to 300 °C and down to -120 °C did not show any fundamental change.

### Nr. 1A-10 CaZrO<sub>3</sub>, Calcium zirconate

1	A few physical properties of CaZrO <sub>3</sub> were studied in comparison with those of some perovskite-type ferroelectrics. The crystal was reported to be orthorhombic with the cell dimensions $a = 5.587 \text{ Å}$ , $b = 8.008 \text{ Å}$ , $c = 5.758 \text{ Å}$ at RT.	
4	Linear thermal expansion: $\alpha = 8.55 \cdot 10^{-6}$ °C <sup>-1</sup> between 23 °C and 223 °C; $\alpha = 9.53 \cdot 10^{-6}$ °C <sup>-1</sup> between 223 °C and 333 °C for ceramics of bulk density $\varrho = 4.95 \cdot 10^{3}$ kg m <sup>-3</sup>	55C1 65B10
9	Infrared absorption: Fig. 289, 290; Tab. 52.	

Tab. 52. CaZrO<sub>3</sub>. Wave numbers in 10<sup>2</sup> m<sup>-1</sup> and symmetry of infrared modes of lattice vibration obtained from Kramers-Kronig analysis of the reflectance data at RT. [65P4]

(Zr-O stretch)	$\widetilde{v}_2$ (Zr-O <sub>3</sub> torsion)	(O-Zr-O bend)	(cation-ZrO <sub>3</sub> lattice mode)
515 (B <sub>1</sub> , B <sub>2</sub> , A <sub>1</sub> )	$ \begin{array}{c} 340 \ (B_1,  B_2,  A_2) \\ (377) \\ (418) \end{array} $	228 (B <sub>1</sub> , B <sub>2</sub> , A <sub>1</sub> ) 186	153 (B <sub>1</sub> , B <sub>2</sub> , A <sub>1</sub> )

<sup>\*</sup> The ficticious spin is \(\frac{1}{2}\) [64G1].

			II 1 Perovsk				
r. 1A-1	1 SrZrO <sub>3</sub> , Stro	ntium zirce	nate			U of come	
	l signles	roperties of	SrZrO <sub>3</sub> were stu	died in	comparison wit	h those of some	57R2
	A-11 SrZrO <sub>3</sub> , Strontum 2rconact  A few physical properties of SrZrO <sub>3</sub> were studied in comparison with those of some perovskite-type ferroelectrics.  The crystal was reported to be pseudo-cubic with $a' = 4.099 \text{ Å}$ at RT.  5  Linear thermal expansion: $\alpha = 8.75 \cdot 10^{-6}  ^{\circ}\text{C}^{-1}$ between 23 $^{\circ}\text{C}$ and 320 $^{\circ}\text{C}$ ;  Linear thermal expansion: $\alpha = 8.75 \cdot 10^{-6}  ^{\circ}\text{C}^{-1}$ between 320 $^{\circ}\text{C}$ for ceramics of bulk density						
Lir	near thermal ex	xpansion: o C-1 betwee	$a = 8.75 \cdot 10^{-6}$ °C and 700	C−1 bet ) °C for	ceramics of bull	density	65B10
	E AA . HP KP	111 .	1, 292; Tab. 53.			1	
Ini			ave numbers in 1	0 <sup>2</sup> m <sup>-1</sup> ners-Kro T. [ <i>651</i>	and symmetry o onig analysis of t	f infrared modes o he reflectance dat	of a
			<del></del>		~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
		$\tilde{\nu}_1$ stretch)	$\tilde{v}_2$ (Zr-O <sub>3</sub> torsion	ı) (	O-Zr-O bend)	(cation-ZrO <sub>3</sub> lattice mode)	
	`	$B_1, B_2, A_1$	325 (B <sub>1</sub> , B <sub>2</sub> , A (357) (379)	2	$\overline{40 \ (B_1, B_2, A_1)}$	143 $(B_1, B_2, A_1)$	
			(319)	'	•	•	٠
NI. 1A	-12 BaZrO <sub>3</sub> , E	Barium zirc	onate				
NI. IA	few propertie	s of BaZrO,	were reported in	compai	rison with those of the cubic with the	f some perovskite- ne cell dimensions	57.72
1 +	whe terroelect	1103.	- 3				57R2
	a = 4.192  A at	l expansion	$\alpha = 5.64 \cdot 10^{-6}$ een 214 °C and 3	°C−1 b	etween 23 °C and for ceramics of b	d 214 °C; ulk density	65B10
	$\alpha = 6.54 \cdot 10^{-6}$ $\alpha = 6.73 \cdot 10^{3}$		$\alpha = 5.64 \cdot 10^{-6}$ een 214 °C and 3				_
9	$\varrho = 0.75^{\circ}$ To	ption: Fig.	293, 294; Tab. 5	4.			'
				. 102		at infrared mo	des
	Tab. 54 of latti	4. BaZrO <sub>3</sub> . ce vibratio	Wave numbers in obtained from data	Krame at RT.	rs-Kronig analys	ies of infrared mo	nce
	of latti	$\tilde{v}_1$	Wave numbers in obtained from data	at RT.	rs-Kronig analys [65P4] $\tilde{v}_{s}$ (O-Zr-O bend)	(cation-ZrO, lattice mode	
	of latti	ice vibrado.	data :	ion)	$\tilde{v}_3$	(cation-ZrO	
	(Zr	$\tilde{v}_1$ -O stretch) $605 (F_{1u})$	data $ \begin{array}{c c} \hline  & \widetilde{v}_2 \\ \hline  & (Zr-O_3 \text{ tors}) \\ \hline  & - (F_{2t}) \end{array} $	ion)	$\frac{\tilde{v}_{s}}{\text{(O-Zr-O bend)}}$ $210 (F_{1u})$	(cation-ZrO, lattice mode	a) )
Nr. 1a	(Zr  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Domaly of P  O stretch	data  variable (Zr-O <sub>3</sub> tors)  (Zr-O <sub>3</sub> tors)  (F <sub>2s</sub> conate  vbZrO <sub>3</sub> associated by Smolensial structure were	ion) with a kii in 1 a found	$\tilde{v}_{s}$ (O-Zr-O bend)  210 ( $F_{1u}$ )  phase transition 950. Antiparalle by Sawaguchi 6	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the lattice shifts on the lattic	de- the 50R1, 50
\ <del></del>	(Zr  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Domaly of P  O stretch	onate  bZrO <sub>3</sub> associated and by SMOLENSI structure were rice double hyster pound in which is	with a kii in 1 e found esis loo double	(O-Zr-O bend)  210 (F <sub>1u</sub> )  phase transition 950. Antiparalle by Sawaguchi ps were discovere hysteresis loops	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the lattice shifts on the lattic	de- the 50R1, 50
\ <del></del>	(Zr  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by (001) project same year ar PbZrO <sub>3</sub> is the	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Domaly of P  O stretch	data  v  (Zr-O <sub>3</sub> tors  - (F <sub>2</sub> )  conate  PbZrO <sub>3</sub> associated and by Smolens al structure were ric double hyster pound in which (IIa)	ion) with a ki fin 1 e found esis loodouble	$\tilde{v}_{s}$ (O-Zr-O bend)  210 ( $F_{1u}$ )  phase transition 950. Antiparalle by Sawaguchi eps were discovere hysteresis loops	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the lattice shifts on the lattic	de- che 51S3 al 50R1, 50 51S8 a)50R1
1a	(Zr  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by (001) project same year ar PbZrO <sub>3</sub> is the phase  state	For the street of the street o	data  vector (Zr-O <sub>3</sub> tors  vector (Zr-O <sub>3</sub>	with a kir in 1 to found esis lood double	(O-Zr-O bend)  210 (F <sub>1u</sub> )  phase transition 950. Antiparalle by Sawaguchi eps were discovere hysteresis loops	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the lattice shifts on the lattic	de- the 50R1, 50. 51S3 51S8
1a	Of latti  (Zr  5  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by (001) project same year ar PbZrO <sub>3</sub> is the phase  state  crystal systems	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Domaly of P Y ROBERT  Strifferroelect ne first com  em  O	data  vector (Zr-O <sub>3</sub> tors  vector (Zr-O <sub>3</sub> associated and by Smolens)  ral structure were ric double hyster pound in which (II*)  Ab)  rthorhombic*	with a kii in 1 e found esis loo double  I a)  Pa  Cubic	(O-Zr-O bend)  210 (F <sub>1u</sub> )  phase transition 950. Antiparalle by Sawaguchi ops were discovere hysteresis loops	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the lattice shifts on the lattic	de- che 51S3 al 50R1, 50 51S8 a)50R1
1a	Of latti  (Zr  5  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by (001) project same year ar PbZrO <sub>3</sub> is the phase state  crystal systems space group	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Domaly of P  O ROBERT Strifferroelect ne first com  em  O	data    vector   vect	with a kir in 1 cound esis loo double Ia Cubic Pm3m	(O-Zr-O bend)  210 (F <sub>1u</sub> )  phase transition 950. Antiparalle by Sawaguchi ps were discovere hysteresis loops	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the stal. in 1951. In the dots of the stal in th	a)  de- the the 50R1, 50 51S3 51S8  a) 50R1 b) 51S8 c) 51S3
1a	Of latti  (Zr  5  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by (001) project same year ar PbZrO <sub>3</sub> is the phase state  crystal system space group  \[ \text{\$\exititt{\$\text{\$\text{\$\text{\$\text{\$\exit{\$\tex{\$\text{\$\text{\$	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Domaly of Pay Robert striferroelect ne first come	data $ \begin{array}{c c} \hline  & & & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & &$	with a kir in 1 cound esis loo double Ia Pm3m  "Ca)  at RT (hase II	(O-Zr-O bend)  210 (F <sub>1u</sub> )  phase transition 950. Antiparalle by Sawaguchi ps were discovere hysteresis loops  (C)  (C)  (C)  (C)  (D)  (C)  (D)  (C)  (D)  (D	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the tal. in 1951. In the description of the cubic unit celevation of the cubic unit	a)  de- the the 50R1, 50 51S3 a) 51S8 a) 50R1 b) 51S8 c) 51S3  1 in ants 2 a',
1a	Of latti  (Zr  5  1A-13 PbZrO <sub>3</sub> Dielectric an pendently by (001) project same year ar PbZrO <sub>3</sub> is the phase state  crystal system space group  \[ \text{\text{\$\text{\$Q\$}}} a = 5.87 \]  \[ \text{\$A\$} \]  phase I becomes a' and c'	F <sub>1</sub> O stretch)  505 (F <sub>1u</sub> )  Momaly of Py ROBERT 2 Sign of cryst netiferroelect ne first com  o  o  o  o  o  o  o  o  o  o  o  o	data $ \begin{array}{c c} \hline  & & & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & & \\ \hline  & &$	with a kii in 1 e found esis loo double  Pa cubic  Pm3m  °Ca)  at RT (  hase II from bit at 15 Å	(O-Zr-O bend)  210 (F <sub>1u</sub> )  220 (P <sub>1u</sub> )  230 (P <sub>1u</sub> )  240 (P <sub>1u</sub> )  250 (P <sub>1u</sub> )  260 (P <sub>1u</sub> )  270 (P <sub>1u</sub> )  280 (P <sub>1u</sub> )  290 (P <sub>1u</sub> )  290 (P <sub>1u</sub> )  290 (P <sub>1u</sub> )  201 (P <sub>1u</sub> )  202 (P <sub>1u</sub> )  203 (P <sub>1u</sub> )  204 (P <sub>1u</sub> )  205 (P <sub>1u</sub> )  206 (P <sub>1u</sub> )  207 (P <sub>1u</sub> )  208 (P <sub>1u</sub> )  209	(cation-ZrO: lattice mode)  115 (F <sub>1u</sub> )  1 was reported incel ionic shifts on the stal. in 1951. In the dby Shirane et awere observed.	a)  de- the the 50R1, 50 51S3 a) 51S8 a) 50R1 b) 51S8 c) 51S3  1 in ants 2 a',

 $\frac{iO_3}{ode)}$ 

10

Crystal growth: PbCl<sub>2</sub> flux method.

	71	
3	Nr. 1A-13 PbZrO, continued $Z=8$ (in phase II). The crystal is polar along the $c$ axis and antipolar along the $a$ axis in phase II. Fig. 295 shows schematically the shifts of Pb ions. Positional parameters and shifts from ideal perovskite positions: Tab. 55. Projection of $ZrO_6$ : Fig. 296, 297, 298. Bond distances between $Zr$ and $O:$ Fig. 299.	51S3, 57J4, 51S3 57J4
4	Thermal expansion: Fig. 300 ··· 303. $\alpha_{\sigma'} \cong -0.05 \cdot 10^{-5}  {}^{\circ}\text{K}^{-1}$ and $\alpha_{c'} \cong 2.80 \cdot 10^{-5}  {}^{\circ}\text{K}^{-1}$ in phase II; $\alpha_{a'} \cong 1.10 \cdot 10^{-5}  {}^{\circ}\text{K}^{-1}$ in phase I, where $\alpha_{a'}$ and $\alpha_{c'}$ are the linear thermal expansion coefficients along the pseudo-tetragonal $a'$ and $c'$ axes, respectively.	5251
5a	Dielectric constants: Fig. 304. $C = 1.36 \cdot 10^5$ °K (determined with ceramics). Effect of pressure: Fig. 305. $(d\Theta_a/dp)_{p\to 0} = (4.1 \pm 0.2) \ 10^{-8}$ °K N <sup>-1</sup> m <sup>2</sup> .	50R1
6a	Critical field: Fig. 306.	66R2
	Specific heat: Fig. 307. For the transition II-I: $\Delta Q_{\rm m} = 440  {\rm cal \ mol^{-1}}$ ; $\Delta S_{\rm m} = 0.88  {\rm cal \ ^oK^{-1} \ mol^{-1}}$ .	<i>52</i> S2
b	Thermal conductivity: Fig. 308.	7232
8	Elastic compliances: Fig. 309.	
9a	Birefringence: Fig. 310. Infrared absorption: Fig. 311, 312; Tab. 56.	
16	Radiation damage: Fig. 313.	
	•	1

Nr. 1a

11

17

Tab. 55. PbZrO<sub>3</sub> (ceramics). Atomic coordinates and shifts from ideal perovskite positions at RT. [57]4]

Atom         x         y         z         Wyckoff notation         Total shift A           Pb' Pb"         0.706         0.127         0 $4c$ 0.26           Pb"         0.706         0.127         0.500 $4c$ 0.26           Zr'         0.243         0.124         0.250 $4c$ 0.04           Zr"         0.243         0.124         0.250 $4c$ 0.04           O(1)'         0.270         0.150         0.980 $4c$ 0.35           O(1)"         0.270         0.100         0.480 $4c$ 0.35           O(2)'         0.040         0.270         0.300 $4c$ 0.53           O(2)"         0.040         0.270         0.750 $4c$ 0.34           O(3)'         0         0.500         0.250 $2b$ 0           O(3)"         0         0.500         0.800 $2b$ 0					-	
Pb"         0.706         0.127         0.500         4c         0.26           Zr'         0.243         0.124         0.250         4c         0.04           Zr"         0.243         0.124         0.250         4c         0.04           O(1)'         0.270         0.150         0.980         4c         0.35           O(1)"         0.270         0.100         0.480         4c         0.35           O(2)'         0.040         0.270         0.300         4c         0.53           O(2)"         0.040         0.270         0.750         4c         0.53           O(3)'         0         0.500         0.250         2b         0           O(3)"         0         0.500         0.250         2b         0		<u> </u>	у	z		shift
Pb" 0.706 0.127 0.500 4c 0.26 Zr' 0.243 0.124 0.250 4c 0.04 Zr" 0.243 0.124 0.250 4c 0.04 O(1)' 0.270 0.150 0.980 4c 0.35 O(1)" 0.270 0.100 0.480 4c 0.35 O(2)' 0.040 0.270 0.300 4c 0.53 O(2)" 0.040 0.270 0.750 4c 0.53 O(3)' 0 0 0.500 0.250 2b 0	Pb'	0.706	0.127	0	4.0	0.04
Zr'         0.243         0.124         0.250         4c         0.04           Zr"         0.243         0.124         0.250         4c         0.04           O(1)'         0.270         0.150         0.980         4c         0.35           O(1)"         0.270         0.100         0.480         4c         0.35           O(2)'         0.040         0.270         0.300         4c         0.53           O(2)"         0.040         0.270         0.750         4c         0.53           O(3)'         0         0.500         0.250         2b         0           O(3)"         0         0.500         0.250         2b         0	Pb"	0.706		, v		
Zr"     0.243     0.124     0.250     4c     0.04       O(1)'     0.270     0.150     0.980     4c     0.35       O(1)"     0.270     0.100     0.480     4c     0.35       O(2)'     0.040     0.270     0.300     4c     0.53       O(2)"     0.040     0.270     0.750     4c     0.53       O(3)"     0     0.500     0.250     2b     0			0.127	0.500	40	0.26
Zr"         0.243         0.124         0.250         4c         0.04           O(1)'         0.270         0.150         0.980         4c         0.35           O(1)"         0.270         0.100         0.480         4c         0.35           O(2)'         0.040         0.270         0.300         4c         0.53           O(2)"         0.040         0.270         0.750         4c         0.53           O(3)'         0         0.500         0.250         2b         0           O(3)"         0         0.500         0.250         2b         0		0.243	0.124	0.250	1 40	0.04
O(1)' 0.270 0.150 0.980 4c 0.35 O(2)' 0.040 0.270 0.270 0.300 4c 0.53 O(3)' 0 0 0.500 0.270 0.500 0.270 0.34 O(3)' 0 0 0.500 0.250 0.500 0.250 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Zr"	0.243	0.124			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0444		0.127	0.230	40	0.04
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	O(1).	0.270	0.150	0.980	40	0.35
O(2)' 0.040 0.270 0.300 4c 0.53 0.34 $O(3)'$ 0 0.500 0.250 2b 0	O(1) "	0.270	0.100			
O(3), 0 0.500 0.250 2 <i>b</i> 0	0(2)	0000			70	0.35
O(3), 0 0.500 0.250 2 <i>b</i> 0	0(2)			0.300	40	0.53
O(3), 0 0.500 0.250 2 <i>b</i> 0	O(2) "	0.040	0.270	0.750		
O(3)"   0   0.500   0.000   2	0/3\!	Λ .	0.500		1	0.54
	888			0.250	2 <i>b</i>	0
	U(3)"	υ	0.500	0.800	2 <i>b</i>	0.41
O(4): 0	0(4)	n 1	_ 1	0.000		0.41
O(4)   0   0.230   2a   0					2a	0
O(4) 0 0 0 0.800 2a 0.41	O(7)	U	U	0.800	2a	0.41

Tab. 56. PbZrO<sub>3</sub>. Wave numbers in 10<sup>2</sup> m<sup>-1</sup> and symmetries of infrared modes of lattice vibration obtained from Kramers-Kronig analysis of the reflectance data at RT. [65P4]

$\tilde{v}_1$ (Zr-O stretch)	$\tilde{v}_2$ (Zr-O <sub>3</sub> torsion)	ν̃ <sub>3</sub> (O-Zr-O bend)	(cation-ZrO, lattice mode)
$508~(E_u,A_1)$	290 $(B_1, E_u)$	221 (E <sub>u</sub> , A <sub>1</sub> )	80 (E <sub>11</sub> , A <sub>1</sub> )

### Nr. 1A-14 PbHfO<sub>3</sub>, Lead hafnate

	iferroelectricity was dis	cussed by Shir	was observed, and the poss	53S3
phase	III	II	I	
state	(A)		P	<i>53S3</i>
crystal system	pseudo-tetragonal	tetragonal	cubic	
Θ	16	l	215 °C	
Lattice constants			4.136 Å, $c'/a' = 0.991$ at RT	. 5353

	above 215 °C: 27				<del>`</del>	-
5a	Dielectric consta $C = 9.5 \cdot 10^4$ °K	(ceramics).				53S3
Nr. 1	1A-15 BiFeO <sub>3</sub> , Bis					1
1a	PbTiO <sub>3</sub> -BiFeO <sub>3</sub> , atures. The Curi solid solution <sup>b</sup> ). Disagreement, h therefore reserva	s pointed out on the that BiFeO <sub>3</sub> could be point was estimated towever, exists a metion is necessary in	have a ferroelected to be about a bout a bou	rine Curie point a 350 °C from stud rimental data re r BiFeO <sub>3</sub> is ferro	ies of the same eported so far electric or anti	b)61F3, 62F
	Antiferromagnet ments at about 3	ic anomaly in BiFe 370 °C°).				- (°)62S10, 63R1,6512
b	phase	IV	III	II	I	_
	state	(A) or (F), A*magn	(A) or (F), P <sub>magn</sub>	(A) or (F), P <sub>magn</sub>	(P), P <sub>magn</sub>	
	crystal system	rhombohedral	rhombohedral	rhombohedral	cubic (possibly)	
İ	space group	R3m-C5**				
	Θ	3	570 ≈5	8 8	50 °C	
	$a = (3.962 \pm 0.0)$ Further reference	001) Å, $\alpha = 89^{\circ} 31'$ des are available on	$\pm$ 3' at RT. unit cell paramet	ters.		64T6 60V2, 60F6 60Z2
	one of the five s	space groups. It 3, I	( ), I( )2, I()III u	.l 4a Aba na	. controurmme	60Z2
	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space The space group not satisfy the The magnetic st experiments. F		st that BIPEO, be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Comment of the statement of	regarded as con Tab. 57. CO <sub>3</sub> belongs to the nates: Tab. 58. MOLENSKII et al., ferromagnetism.	the non-centro	63K5 64T6 n 64S9 63K5
4	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the Country The magnetic stexperiments. Further was a superiment of the magnetic stexperiment of the magnetic stexperiments.	tion studies suggested R3m. The crystal A BiO <sub>3</sub> trigonal pyrathe electron diffract the group R3m at RT o R3m was, however conditions for the extracture of BiFeO <sub>3</sub> wing. 317, 318.  Heters: Fig. 319, 320.	structure can be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be C. See also	regarded as con Tab. 57. CO <sub>3</sub> belongs to the nates: Tab. 58. MOLENSKII et al., ferromagnetism.	the non-centro	63K5 64T6 n 63K5
4 5a	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the Country The magnetic st experiments. Further cell param Dielectric const. No reliable data	tion studies suggested R3m. The crystal A BiO <sub>3</sub> trigonal pyrache e group R3m at RT o R3m was, howeve conditions for the extructure of BiFeO <sub>3</sub> wig. 317, 318.	at that BIPEO, be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Compared	regarded as con Tab. 57. sO <sub>3</sub> belongs to mates: Tab. 58. noLENSKII et al., ferromagnetism. G-type by the neu	the non-centro because it doe atron diffractio	63K5 64T6 64S9 63K5 66R8, 64T
	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the Carlo The magnetic stexperiments. Furit cell param Dielectric const. No reliable data are available.	tion studies suggested R3m. The crystal BiO <sub>3</sub> trigonal pyrathe electron diffract the group R3m at RT to R3m was, however conditions for the extracture of BiFeO <sub>3</sub> with Eig. 317, 318.	at that BIPEO, be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Compared to be Compared to be Compared to the Compared to	regarded as con Tab. 57. eO <sub>3</sub> belongs to mates: Tab. 58. HOLENSKII et al., ferromagnetism. G-type by the neuth temperature regarded.	the non-centro because it doe atron diffractio	63K5 64T6 64S9 63K5 66R8, 64T
5a	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the Country The magnetic st experiments. Further constant of the magnetic constant of the magnetic constant of the magnetic suscepated are available.  Magnetic suscepated RT, no spoon	tion studies suggested R3m. The crystal d BiO <sub>3</sub> trigonal pyra he electron diffract the group R3m at RT o R3m was, however conditions for the extracture of BiFeO <sub>3</sub> wing. 317, 318.  Heters: Fig. 321, 320, and: Fig. 321, 322, 3 and the dielectric contibility: Fig. 324. Intaneous magnetic mat: Fig. 325, 326.	at that BIFEO, be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Common See also	regarded as con Tab. 57.  eO <sub>3</sub> belongs to nates: Tab. 58.  nolenskii et al., ferromagnetism. G-type by the neuron temperature regarded in the fields	the non-centro because it does atron diffraction gion near 850 °	63K5 64T6 64S9 63K5 66R8, 64T
5a 11	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the Carlon trick the magnetic stexperiments. Further constant the constant of the symmetric constant trick the space group not satisfy the Carlon trick the symmetric stexperiments. Further constant constant trick the symmetric constant trick the symmetric susception of the symmetric susception of the symmetric susception of the symmetric state	tion studies suggested R3m. The crystal BiO <sub>3</sub> trigonal pyrathe electron diffract the group R3m at RT or R3m was, however conditions for the extracture of BiFeO <sub>3</sub> wing. 317, 318.  The electron diffract the extracture of BiFeO <sub>3</sub> wing. 317, 318.  The electric state of the electric conditions of the extracture of BiFeO <sub>3</sub> wing. 319, 320, and the dielectric conditions of the dielectric conditions of the electric conditions o	at that BIFEO, be structure can be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Common to the high moment was obsertied and their fields and	regarded as con Tab. 57.  eO <sub>3</sub> belongs to nates: Tab. 58.  nolenskii et al., ferromagnetism. G-type by the neuron temperature regarded in the fields	the non-centro because it does atron diffraction gion near 850 °	63K5 64T6 64S9 63K5 66R8, 64T
5a 11 12c	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the control of the magnetic stexperiments. Further was a construction of the symmetric construction of the symmetric construction of the symmetric susception of the symmetric susception of the symmetric susception of the symmetric susception of the symmetric construction of the symmetric susception of the symmetric susception of the symmetric symmetric susception of the symmetric	tion studies suggested R3m. The crystal d BiO <sub>3</sub> trigonal pyrathe electron diffract the group R3m at RT or R3m was, however conditions for the exprecture of BiFeO <sub>3</sub> wing. 317, 318.  Heters: Fig. 319, 320.  Hand the dielectric contribution of the dielectric contribution. The dielectric contribution of the dielectric contribution of the dielectric contribution. The dielectric contribution of the dielectric contribution of the dielectric contribution. The dielectric contribution of the dielect	at that BIFEO, be structure can be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Common to the high moment was obsertied and their fields and	regarded as con Tab. 57.  eO <sub>3</sub> belongs to nates: Tab. 58.  forcomagnetism. Grype by the new the temperature regarded in the fields	the non-centro because it does atron diffraction gion near 850 °	63K5 64T6 ss 64S9 63K5 66R8, 64T
5a 11 12c	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the control of the magnetic stexperiments. Funit cell param Dielectric const. No reliable data are available.  Magnetic susceptat RT, no sponding sponding of the batter of the batter of the batter of the space. Tab. 57. BiFe interatomic dist	tion studies suggested R3m. The crystal d BiO <sub>3</sub> trigonal pyra he electron diffract the group R3m at RT to R3m was, however conditions for the erructure of BiFeO <sub>3</sub> wig. 317, 318.  Leters: Fig. 319, 320. Leters: Fig. 321, 322, 32 a on the dielectric conditions for the error of BiFeO <sub>3</sub> with the dielectric conditions. The dielectric conditions in the dielectric conditions are suggested as a contract of the internal electric usis of an ionic model of the cances [Å]. [63K5].	ed that BIFEO, be structure can be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Comment was observed to be Comment was observed.	regarded as con Tab. 57.  eO <sub>3</sub> belongs to nates: Tab. 58.  forcomagnetism. Grype by the new the temperature regarded in the fields	the non-centro because it does atron diffraction gion near 850 ° s up to 22 kOes	63K5 64T6 ss 64S9 63K5 66R8, 64T
5a 11 12c	Neutron diffract tric space group nating FeO <sub>3</sub> and According to the symmetric space. The space group not satisfy the control of the magnetic stexperiments. Funit cell param Dielectric const. No reliable data are available.  Magnetic susceptat RT, no sponding sponding of the batter of the batter of the batter of the space. Tab. 57. BiFe interatomic dist	tion studies suggested R3m. The crystal d BiO <sub>3</sub> trigonal pyrathe electron diffract the group R3m at RT to R3m was, however conditions for the erructure of BiFeO <sub>3</sub> wig. 317, 318.  Leters: Fig. 319, 320.  Lant: Fig. 321, 322, 32 at on the dielectric conditions for the error of BiFeO <sub>3</sub> with the dielectric conditions. The dielectric conditions for the dielectric conditions are suggested as a contract of the internal electric usis of an ionic model. Co. Values of the cances [Å]. [63K5]. See also [64T6]	that BIFEO, be structure can be structure can be smids: Fig. 316; ion study, BiFe. Atomic coording, rejected by Swistence of weak as proved to be Comment was observed to be Comment was observed.  Tab. 58.	regarded as con Tab. 57.  eO <sub>3</sub> belongs to nates: Tab. 58.  followed as con Tab. 58.  followed as con Tab. 58.  ferromagnetism.  G-type by the new the temperature regarded in the fields  gradients in BiFe  BiFeO <sub>3</sub> . Ato	the non-centro because it does atron diffraction gion near 850 ° s up to 22 kOe.	63K5 64T6 es 64S9 63K5 66R8, 64T C es 67T7

3S3

1S3 3S3

7J4,

[*57J4*]

vibration

1a	Ferroelectric	behavior in KIC	)3 was repor	ted by HERLAC	н in 1961.		61H3
b	phase	Va)	IVa)	IIIa)	IIa)	Ia)	*)61H3
	state		Fa)	Fa)	Fa)	Pa)	
	crystal system			trigonalb)*		trigonala)	b)60S5
	Θ T 500 m		·) —18, —	10a)** 70	)a) 21	2a) °(	
		03 kg m <sup>-3</sup> . value, 3.802, is a 0.005) Å $\alpha = 89$ $\alpha = 8.916$ Å, $\alpha = 89$				RT, adoptin	66H17 08g1 60S5 65F3
2a	perature: Fig.	method: Fig. 32 he supersaturate 328.	ed solution		, HIO3 at a	constant ten	61H3 27m1
3 	Z = 6 III pliase	III, adopting t	riclinic syst	em.	· · · · · ·		61H3 65F3
<b>!</b> 		ation: $a = [4.4 \\ 0.09 (T - 220)]$	in phase I	$(T - 220)] \dot{A}$	,		61H3
5a		ants: Fig. 329,					66H17
c l							
_			551.				61H3
	Absorption edge		331.				61H3
a B	Absorption edg  NMR: Fig. 333.  Complex perovs	e: Fig. 332. skite-type oxid	es				61H3 67V2 61H3
Da Da Da Da	Absorption edg	e: Fig. 332.  skite-type oxid  iO <sub>3</sub> , Potassium	es bismuth tit		I and Agra	NOVSKAYA in	67V2 61H3
B (Ir. 1	Absorption edg  NMR: Fig. 333.  Complex perovs  1B1-i (K <sub>1/2</sub> Bi <sub>1/2</sub> )T	e: Fig. 332.  skite-type oxid  iO <sub>3</sub> , Potassium	es bismuth tit	by Smolenski	I and Agra	NOVSKAYA in	67V2 61H3
B (Ir. 1	Absorption edge NMR: Fig. 333. Complex perove 1B1-i (K <sub>1/2</sub> Bi <sub>1/2</sub> )T Ferroelectricity 1959.	e: Fig. 332.  skite-type oxid  iO <sub>3</sub> , Potassium  in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO	es bismuth tit		I and Agra	NOVSKAYA in	67V2 61H3
a B (r. 1	Absorption edg NMR: Fig. 333. Complex perove 1B1-i (K <sub>1/2</sub> Bi <sub>1/2</sub> )T Ferroelectricity 1959. phase	e: Fig. 332.  skite-type oxid  iO <sub>3</sub> , Potassium  in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO	es bismuth tite 0 <sub>3</sub> was found	I by Smolenski	I and Agra	NOVSKAYA in	67V2 61H3
B (Ir. 1	Absorption edge  NMR: Fig. 333.  Complex perove  1B1-i (K <sub>1/2</sub> Bi <sub>1/2</sub> )T  Ferroelectricity 1959. phase  state	e: Fig. 332.  skite-type oxid FiO <sub>3</sub> , Potassium in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO  III  (F)	es bismuth tite s was found II (A)	I by SMOLENSKI  I  P  ubic cubic		NOVSKAYA in	67V2 61H3
B (Nr. 1	Absorption edge  NMR: Fig. 333.  Complex perove  1B1-i (K <sub>1/2</sub> Bi <sub>1/2</sub> )T  Ferroelectricity 1959. phase state crystal system space group  Ø	e: Fig. 332.  skite-type oxid  iO <sub>3</sub> , Potassium  in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO  III  (F)  tetragonal	es bismuth tite 03 was found II (A) pseudo-cu	I by SMOLENSKI P  abic cubic Pm3m-(	<u>D</u>	NOVSKAYA in	67V2 61H3
B (Ir. 1	Absorption edge  NMR: Fig. 333.  Complex perove  1B1-i (K <sub>1/2</sub> Bi <sub>1/2</sub> )T  Ferroelectricity 1959. phase state crystal system space group	e: Fig. 332.  Skite-type oxid  iO <sub>3</sub> , Potassium  in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO  III  (F)  tetragonal	es bismuth tite 03 was found	I by SMOLENSKI P  abic cubic Pm3m-(	<u>D</u>	NOVSKAYA in	67V2 61H3 59S6 62I5 *)60S6
B of the state of	Absorption edge NMR: Fig. 333.  Complex perove 1B1-i $(K_{1/2}Bi_{1/2})T$ Ferroelectricity 1959. phase state crystal system space group $\Theta$ $a = (3.913 \pm 0.0)$	e: Fig. 332.  skite-type oxid  io <sub>3</sub> , Potassium  in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO  III  (F)  tetragonal  27  203) Å, c = (3.99  :: Disordered per control of the contro	es bismuth tite 03 was found	I by SMOLENSKI P  abic cubic Pm3m-(	<u>D</u>	NOVSKAYA in	67V2 61H3 59S6
B (B)	Absorption edge NMR: Fig. 333.  Complex perove 1B1-i $(K_{1/2}Bi_{1/2})T$ Ferroelectricity 1959. phase state crystal system space group $\Theta$ $a = (3.913 \pm 0.0)$ Crystal structure Lattice distortion Thermal expansion Dielectric constant	skite-type oxid FiO <sub>3</sub> , Potassium in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO III (F) tetragonal  27 203) Å, $c = (3.99)$ $c: Disordered per (3.99)$ $c: Fig. 334$ $c: Fig. 335$ $c: Fig. 336$	bismuth tite  y was found  II  (A)  pseudo-cu  70  4  93 ± 0.003)  rovskite.	I by SMOLENSKI Pubic cubic Pm3m-( 10,380a) °( Å at RT.	<u>D</u>	NOVSKAYA in	67V2 61H3 59S6 62I5 *)60S6
9a   1B (Nr. 1 a   b	Absorption edge NMR: Fig. 333.  Complex perove 1B1-i $(K_{1/2}Bi_{1/2})T$ Ferroelectricity 1959. phase state crystal system space group $\Theta$ $a = (3.913 \pm 0.0)$ Crystal structure Lattice distortion Thermal expansion	e: Fig. 332.  skite-type oxid  fiO <sub>3</sub> , Potassium  in (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO  III  (F)  tetragonal  27  203) Å, c = (3.99  1: Disordered per  1: Fig. 334.  21: Fig. 335.  22: Disordered per  23: Disordered per  24: Fig. 336.	es bismuth tite 03 was found  II (A) pseudo-cu 70 4 93 ± 0.003) rovskite.	I by SMOLENSKI Pubic cubic Pm3m-(10,380a) °( Å at RT.	<u>Dk</u>		67V2 61H3 59S6 62I5 *)60S6

64

Nr.

1a
b

2a
3
4
5a
6
8a

Nr. 1
1a
b

3

5a

Landolt-

3 4 5a

		1.	i i Perovskite-	type oxides	Figures p. 2/8
1b	phase	III	II	I	
ľ	state	F	(A)	P .	
	crystal system	rhombohedral	pseudo-cubic	cubic	6215
1	space group			Pm3m-O <sub>h</sub>	
	$\Theta$	≈20	00a) 32	20 °C	a)60S6
	$a = (3.891 \pm 0.00)$	002) Å, $\alpha = 89^\circ$	$36' \pm 3'$ at RT.		
3	Crystal structure	e: Disordered per	ovskite.		6215
4	Thermal expans	ion: Fig. 337.			
5a	Dielectric consta	-			(05)
С	Spontaneous pol $E_c \approx 14 \cdot 10^2 \text{ kV}$	arization and coe m <sup>-1</sup> at 116 °C.	ercive field: $P_{ m s} \approx$	≈ 8.0 · 10 <sup>-2</sup> C m <sup>-2</sup> ;	60\$6
Nr.	1B2-i Pb(Mg <sub>1/2</sub> W	<sub>1/2</sub> )O <sub>3</sub>			
1a	Antiferroelectric in 1959.	properties of Pb	(Mg <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> we	ere discovered by Sm	olenskii et al. 59S7
ь	phase	II	I		
	state	A	P		
	crystal system	orthorhombic	cubic		62Z1
	space group	C222 <sub>1</sub> -D <sub>2</sub> <sup>5</sup>			·
ŀ	Θ	31	8 °C		
	a = 22.74  Å, b = 0	= 22.79 Å, $c = 1$ nit cell: see Fig.	5.90 Å at RT. 339.		
2a	Crystal growth:	Crystal growth	of Pb(Mg <sub>1/2</sub> W <sub>1/2</sub>	O <sub>3</sub> was reported by	Myl'nikova. 60M2
3	Crystal structur $Z = 64$ (molecul	e: Pb(Mg <sub>1/2</sub> W <sub>1/2</sub> ) lar unit: Pb <sub>2</sub> MgV	$O_3$ has the struct $VO_6$ ).	ture of perovskite ty	pe. Fig. 339. 62Z1
4	Lattice distortic	n associated with	n the phase trans	sition.	62Z1
5a	Dielectric constant $d\Theta_{\mathbf{a}}/dp = -5.8$	ants: Fig. 341, 34 34 · 10 <sup>8</sup> °K N <sup>-1</sup> m	2, 343. 2.		
6	Specific heat: F Transition heat	ig. 344. (II $\rightarrow$ I): $\Delta Q_{\mathbf{m}} =$	= 276 cal mol <sup>-1</sup> .		66S28
8a.	Elastic complian	nce: Fig. 345.	347.		
1a	1B2-ii Pb(Cd <sub>1/2</sub> W		s reported by Br	ELYAEV et al. in 1963	63B3
b	phase	$(Cd_{1/2}W_{1/2})O_3$ wa	s reported by Di		0,2,
	state	(A)	P		
		monoclinic	cubic		
	crystal system		00 °C		65F4
	$a = (4.156 \pm 0)$ ROGINSKAYA at	.002) Å, $b = (4.0)$ d Venevisev re	$74 \pm 0.002$ ) Å, $\beta$ eported that and	$t = 91^{\circ}9' \pm 5'$ at R3 other transition exist	Γ. s at 120 °C, in
3	addition to the	transition at 400	°C.		65 K4
3	voids of the per	e: Superstructur ovskite lattice, v	e lines, indicatin vere observed.	g ordered location of	the octanedral 65F4
	_				
4 5a	Lattice distorti	on: Fig. 348, 349			

Nomura

17

3

!3

56

15

60S6

2*I5* 

5956

Nr. 1

5a

Nr. 11

Nr. 11

2a

9a

12b

1a	A synthesis of	2W <sub>1/2</sub> )O <sub>3</sub>		<del></del>			
b	phase	$Pb(Mn_{1/2}W_{1/2})O_3$	was reported 	by Venev	TSEV et al.		64V3
	state	(A), P <sub>magn</sub>	P, P <sub>magn</sub>	_			
	crystal system		- Cubic	-			
	Θ	4:	23 °K	_			65R5
	a = 4.063  Å, b	$= 4.033 \text{ Å}, \beta = 9$	00° 12' at RT				ļ
5a	Dielectric const	ant: Fig. 351.					65R5
0	Electrical cond	uctivity: $\sigma = 8 \cdot 1$	10 <sup>-8</sup> Ω <sup>-1</sup> m <sup>-1</sup>				-
1	Magnetic susce	ptibility: see Fig.	351.				65R5
			•				ı
Vг.	1B2-iv Pb(Co <sub>1/2</sub> W	7 . )0					
1a				·			
la	et al.	erroelectric proper	ties in Pb(Co	$_{1/2}W_{1/2})O_3$	were discove	red by Filip'ev	1
ь	phase	IV	III	I	II ·	l I	63F1 65B8
	state	F, F <sub>magn</sub> (weak)	F, P <sub>ma</sub>	gn A	A, P <sub>magn</sub>	P, P <sub>magn</sub>	*)66K6
	crystal system				horhombic	cubic	- b)64F4
	$\Theta$		9a)	83 · · · 103		)3b) °K	-
	a = 4.008  Å  at  2	298 °K.			30	95	
2a	Crystal growth:	Flux method with	ı PbO.	· · · · · · · · · · · · · · · · · · ·			
	Crystal structure						65B8
3	the three direction	e: A superstructure e population of the ons. The real elem 2a for phase I ar $\beta/2$ ) for II, where $\alpha$	e was observe e oxygen octa entary lattic	e is a cubic	face centere	t cations along ad one with the	65B8 64F4
	the three direction	e: A superstructure e population of the ons. The real elem 2a for phase I ar B/2) for II, where a	e was observed oxygen octal entary lattice and with the $a$ , $b$ and $\beta$ are	e is a cubic	face centere	t cations along ad one with the	
-	the three directic parameter $A = 2a \sin(\mu a)$ and $C = 2a \sin(\mu a)$ lattice.	e: A superstructure population of the population of the lem 2a for phase I ar \(\beta/2\)) for II, where a lattice 3.017 Å at 298 °K	e was observed e oxygen octal entary lattice and with the $a$ , $b$ and $\beta$ are parameters	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	
	the three directic parameter $A = 1$ and $C = 2a \sin(\mu)$ lattice.  phase  I $A = 8$ II $A = 8$	e: A superstructure population of the population of the population of the population. The real elem 2a for phase I ar 3/2) for II, where a lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95	e was observed e oxygen octal entary lattice and with the $a$ , $b$ and $\beta$ are parameters	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	64F4
	the three directic parameter $A = 2a \sin(\mu a)$ and $C = 2a \sin(\mu a)$ lattice.	e: A superstructure population of the population of the population of the population. The real elem 2a for phase I ar 3/2) for II, where a lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95	e was observed e oxygen octal entary lattice and with the $a$ , $b$ and $\beta$ are parameters	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	
a	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 8  Lattice distortion  Dielectric constan	e: A superstructure population of the population of the sum. The real elem 2a for phase I are 3/2) for II, where a lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 at: Fig. 352.	e was observed a coxygen octate entary lattice and with the a, b and $\beta$ are parameters  16 Å, $C = 5.6$	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	64F4
a .	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 9  Lattice distortion  Dielectric constant  Polarization: Fig.	e: A superstructure population of the population of the pass. The real elem 2a for phase I ar B/2) for II, where a lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 at: Fig. 353, 354, 356.	e was observed a coxygen octate entary lattice and with the a, b and $\beta$ are parameters  16 Å, $C = 5.6$ 355.	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	64F4
	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 9  Lattice distortion  Dielectric constant  Polarization: Fig.	e: A superstructure population of the population of the sum. The real elem 2a for phase I are 3/2) for II, where a lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 at: Fig. 352.	e was observed a coxygen octate entary lattice and with the a, b and $\beta$ are parameters  16 Å, $C = 5.6$ 355.	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	64F4
a	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 9  Lattice distortion  Dielectric constant  Polarization: Fig.	e: A superstructure population of the population of the pass. The real elem 2a for phase I ar B/2) for II, where a lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 at: Fig. 353, 354, 356.	e was observed a coxygen octate entary lattice and with the a, b and $\beta$ are parameters  16 Å, $C = 5.6$ 355.	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	64F4
a	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 9  Lattice distortion  Dielectric constant  Polarization: Fig.	lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 11: Fig. 353, 354, 356.	e was observed a coxygen octate entary lattice and with the a, b and $\beta$ are parameters  16 Å, $C = 5.6$ 355.	e is a cubic parameters the param	face centered face centered for A = 2 cos eters of the p	t cations along ad one with the	64F4
a c c	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 8  Lattice distortion  Dielectric constant  Polarization: Fig.  Magnetic susception  B2-v Pb(Mn <sub>1/2</sub> Re <sub>1</sub>	lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 11: Fig. 353, 354, 1356.  billity and magnet	e was observed a coxygen octal entary lattice and with the $a$ , $b$ and $\beta$ are parameters  16 Å, $C = 5.6$ 355.  tization: Fig.	e is a cubic parameters the param he param he see 189 Å at 25 357, 358.	face centered face centered face centered face and we have a coseters of the part of the p	t cations along ad one with the	64F4
a c	the three directic parameter $A = 1$ and $C = 2a \sin(\mu a)$ lattice.  phase  I  A = 8  II  A = 8  Lattice distortion  Dielectric constant  Polarization: Fig.  Magnetic susception  B2-v Pb(Mn <sub>1/2</sub> Re <sub>1</sub>	lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 11: Fig. 353, 354, 356.	e was observed a coxygen octal entary lattice and with the $a$ , $b$ and $\beta$ are parameters  16 Å, $C = 5.6$ 355.  tization: Fig.	e is a cubic parameters the param he param he see 189 Å at 25 357, 358.	face centered face centered face centered face and we have a coseters of the part of the p	t cations along ad one with the	64F4
a c	the three directic parameter $A = 1$ and $C = 2a \sin(t)$ lattice.  phase  I  A = 8  II  A = 8  Lattice distortion  Dielectric constar  Polarization: Fig.  Magnetic suscepti  B2-v Pb(Mn <sub>1/2</sub> Re <sub>1</sub>	lattice 3.017 Å at 298 °K 5.669 Å, B = 7.95 11: Fig. 352.  12: Fig. 353, 354, 13: Sign and magnet  (Mn <sub>1/2</sub> Re <sub>1/2</sub> )O <sub>3</sub> wa  III	e was observed a coxygen octate entary lattice and with the a, b and $\beta$ are parameters  16 Å, $C = 5.6$ 355.  tization: Fig. 8 reported by	seeina by de is a cubic parameters the param file param file see is a cubic parameters the param file see is a cubic parameters the param file see is a cubic parameters the parameters the parameters at 25 and 25	ev et al.	t cations along ad one with the	64F4
a c	the three directic parameter $A = 1$ and $C = 2a \sin(t)$ lattice.  phase  I $A = 8$ II  Lattice distortion  Dielectric constant  Polarization: Fig.  Magnetic susception  A synthesis of Pb  phase	e: A superstructure population of the population	e was observe e oxygen octaentary lattice and with the $a$ , $b$ and $\beta$ are parameters  16 Å, $C = 5.6$ 355.  tization: Fig. s reported by II	seeina by de eis a cubic parameters the param he param sees the param sees 357, 358.	ev et al.	t cations along ad one with the	64F4 64F4
a c	the three directic parameter $A = 1$ and $C = 2a \sin(t)$ lattice.  phase  I  A = 8  II  A = 8  Lattice distortion  Dielectric constant  Polarization: Fig.  Magnetic susception  B2-v Pb(Mn <sub>1/2</sub> Re <sub>1</sub> A synthesis of Pb  phase  state  crystal system	e: A superstructure population of the population	e was observed by oxygen octate entary lattice and with the a, b and β are parameters  16 Å, C = 5.6  355.  tization: Fig.  (A), P <sub>magn</sub> monoclinic	seeina by de eis a cubic parameters the param the param sees the param sees the param sees the param sees the param sees the param sees the param sees the param sees the param sees the param sees the param sees the parameters the p	s of the part of t	t cations along ad one with the	64F4
a	the three directic parameter $A = 1$ and $C = 2a \sin(b)$ lattice.  phase  I  A = 8  II  A = 8  Lattice distortion  Dielectric constant  Polarization: Fig.  Magnetic susception  B2-v Pb(Mn <sub>1/2</sub> Re <sub>1</sub> A synthesis of Pb phase  state  crystal system $A = 8$	e: A superstructure population of the population	e was observed oxygen octal entary lattice and with the a, b and β are parameters  6 Å, C = 5.6  355.  tization: Fig.  s reported by II  (A), P <sub>magn</sub> monoclinic  333' at RT.	seeina by ce is a cubic parameters the parameters the param 389 Å at 25 357, 358.	s of the part of t	t cations along ad one with the	64F4 64F4

4	Lattice distortion	n: Fig. 359.			65R5
0	Electrical condu	ctivity: $\sigma = 1$	10 <sup>-1</sup> Ω <sup>-1</sup> m <sup>-1</sup> .		65R5
Nr.	The linear temperand the appearing ferromagnetic puring sign of the individual Re <sup>6+</sup> ions. How moments agree	erature dependent of the spontant roperties in this rect exchange in vever, the magrature with the experi- uteraction between ncies.	eous moment at 1 compound, which teraction propose itudes of the commental values or	Fig. 360. a positive value of $\Theta_{pmagn} = 85$ °K, 03 °K, may indicate the presence of a is in agreement with the positive ed by Goodenough for $Mn^{2+}$ and alculated theoretical spontaneous ally on the assumption of an anti-led in an ordered fashion over the	65R5
a	Ferroelectricity	in Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> )	O <sub>3</sub> was discovere	ed by Smolenskii et al. in 1959.	5959
b	phase	II	I		
	state	F	P		5959
-	crystal system	tetragonala) (possibly)	cubic		
	$\Theta$	9	0 °C		a)60I3
	-	001)  Å,  c = (4.08)	$83 \pm 0.001$ ) Å at	RT.•)	
	Crystal structur	e: In the powde	r patterns, addit	tional to the principal lines of the served indicating a doubling of the	5913
a	Dielectric consta			·	
c	Spontaneous po	larization: $P_{\rm s} pprox$	3.6 · 10 <sup>-2</sup> cm <sup>-2</sup> a	at 18 °C.	59S9
	1B3-ii Pb(Mn <sub>1/2</sub> N A synthesis of I TSEV et al.		with perovskite	structure was reported by VENEV-	64V3
a.	A synthesis of I	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	with perovskite		64V3
a	A synthesis of F rsev et al. 1B3-iii Pb(Fe <sub>1/2</sub> N	$\mathrm{Pb}(\mathrm{Mn}_{1/2}\mathrm{Nb}_{1/2})\mathrm{O}_3$ $\mathrm{Nb}_{1/2}\mathrm{O}_3$		structure was reported by VENEV-	64V3 58S4
a	A synthesis of F rsev et al. 1B3-iii Pb(Fe <sub>1/2</sub> N	$\mathrm{Pb}(\mathrm{Mn}_{1/2}\mathrm{Nb}_{1/2})\mathrm{O}_3$ $\mathrm{Nb}_{1/2}\mathrm{O}_3$			
a   Nr. 1a	A synthesis of F TSEV et al.  1B3-iii Pb(Fe <sub>1/2</sub> N	$\mathrm{Pb}(\mathrm{Mn}_{1/2}\mathrm{Nb}_{1/2})\mathrm{O}_3$ $\mathrm{(b}_{1/2})\mathrm{O}_3$ in $\mathrm{Pb}(\mathrm{Fe}_{1/2}\mathrm{Nb}_{1/2})$	)O <sub>3</sub> was discover	structure was reported by Venev- red by Smolenskii et al. in 1958.	
a   Nr. 1a	A synthesis of F TSEV et al.  1B3-iii Pb(Fe <sub>1/2</sub> N Ferroelectricity phase state	${ m Pb}({ m Mn}_{1/2}{ m Nb}_{1/2}){ m O}_3$ ${ m in}\ { m Pb}({ m Fe}_{1/2}{ m Nb}_{1/2})$	<sub>s</sub> )O <sub>3</sub> was discove	structure was reported by Venev- red by Smolenskii et al. in 1958.	5854
a   Nr. 1a	A synthesis of F rsev et al.  1B3-iii Pb(Fe <sub>1/2</sub> N Ferroelectricity phase state crystal system	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (b <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> III F, A <sub>magn</sub>	)O <sub>3</sub> was discover II F, P <sub>magn</sub>	structure was reported by Venev- red by Smolenskii et al. in 1958.	58S4
a   Nr. 1a	A synthesis of F TSEV et al.  1B3-iii Pb(Fe <sub>1/2</sub> N  Ferroelectricity phase state crystal system space group	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (b <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> III  F, A <sub>magn</sub> rhombohedral	)O <sub>3</sub> was discover II F, P <sub>magn</sub> rhombohedral	structure was reported by Venev- red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-O <sup>1</sup> <sub>h</sub>	58S4
a   Nr. 1a	A synthesis of F TSEV et al.  1B3-iii Pb(Fe <sub>1/2</sub> N  Ferroelectricity phase state crystal system space group Θ	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (b <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> III  F, A <sub>magn</sub> rhombohedral	)O <sub>3</sub> was discover II F, P <sub>magn</sub> rhombohedral	structure was reported by Venev- red by Smolenskii et al. in 1958.  I P, Pmagn cubic	58S4
Nr. 1a b	A synthesis of F rsev et al.  1B3-iii Pb(Fe <sub>1/2</sub> N Ferroelectricity phase state crystal system space group $\Theta$ $a = 4.014 Å, \alpha$	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (b <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/3</sub> III  F, A <sub>magn</sub> rhombohedral  14  = 89.92° at RT.	$O_3$ was discovering $O_3$ was discovering	structure was reported by Venev- red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-O <sup>1</sup> <sub>h</sub>	58S4 62B7 64S8
Nr. 1a	A synthesis of Freevet al.  1B3-iii Pb(Fe <sub>1/2</sub> N)  Ferroelectricity phase state crystal system space group $\Theta$ $a = 4.014 \text{ Å}, \alpha$ Crystal growth: Crystal structur ordering in the found in the moment of the	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (b <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  14  = 89.92° at RT.  Flux method with the cotahedral sites eutron diffraction for the contensity of the (	II F, P <sub>magn</sub> rhombohedral  43 38 44 36 45 46 47 38 48 38 48 48 38 48 49 49 40 40 40 40 40 40 40 40 40 40 40 40 40	structure was reported by Venev- red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-O <sup>1</sup> <sub>h</sub>	58S4 
a   Nr. 11a   b   2a	A synthesis of Freevet al.  1B3-iii Pb(Fe <sub>1/2</sub> N)  Ferroelectricity phase state  crystal system space group $\Theta$ $a = 4.014 \text{ Å}, \alpha$ Crystal growth:  Crystal structur ordering in the found in the n moment of the culation of the	bb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  14  = 89.92° at RT.  Flux method with the contained and the	II F, P <sub>magn</sub> rhombohedral  43 38 44 36 45 46 47 48 48 38 48 48 49 49 40 40 40 40 40 40 40 40 40 40 40 40 40	structure was reported by Venev-  red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-Oh 37 °K  studies have not shown any ionic tructure. The magnetic peak was at 78 °K. The effective magnetic + 0.16) µR at 78 °K from the cal-	58S4 
a   Nr. 1a   b   2a   3	A synthesis of F TSEV et al.  1B3-iii Pb(Fe <sub>1/2</sub> N)  Ferroelectricity phase state crystal system space group $\Theta$ $a = 4.014 \text{ Å}, \alpha$ Crystal growth:  Crystal structur ordering in the found in the n moment of the culation of the moment at 0 °F	bb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  = 89.92° at RT.  Flux method with the contained a sites eutron diffraction for the cut of the (X. Fig. 362.  ant: Fig. 363.	II F, P <sub>magn</sub> rhombohedral  43 38 44 36 45 46 47 48 48 38 48 48 49 49 40 40 40 40 40 40 40 40 40 40 40 40 40	structure was reported by Venev-  red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-Oh 37 °K  studies have not shown any ionic tructure. The magnetic peak was at 78 °K. The effective magnetic + 0.16) µR at 78 °K from the cal-	58S4 
2a 3 5a 9a 11	A synthesis of F TSEV et al.  1B3-iii Pb(Fe <sub>1/2</sub> N Ferroelectricity phase state crystal system space group $\Theta$ $a = 4.014 \text{ Å}, \alpha$ Crystal growth: Crystal structur ordering in the found in the moment of the culation of the moment at 0 °F Dielectric const Optical absorpt Magnetic suscepact $\mu$ eff = 5.4 $\mu$ B.	bb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  = 89.92° at RT.  Flux method with the contained a sites eutron diffraction for the cut of the (X. Fig. 362.  ant: Fig. 363.	II F, P <sub>magn</sub> rhombohedral  43 38 ath PbO. erovskite; X-ray s of perovskite s on experiments a und to be (0.80 111) reflection, w	structure was reported by Venev-  red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-Oh 37 °K  studies have not shown any ionic tructure. The magnetic peak was at 78 °K. The effective magnetic + 0.16) µR at 78 °K from the cal-	58S4 
1a   Nr. 1a   b   2a   3	A synthesis of Freevet al.  1B3-iii Pb(Fe <sub>1/2</sub> N)  Ferroelectricity phase state  crystal system space group  Θ  a = 4.014 Å, α  Crystal growth:  Crystal structur ordering in the found in the noment of the culation of the imment at 0 °F  Dielectric const  Optical absorpt  Magnetic suscepueff = 5.4 μ <sub>B</sub> .  ESR: Fig. 366.	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> in Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  = 89.92° at RT.  Flux method wire: Disordered proctahedral sites eutron diffraction fresh in was fountensity of the (C. Fig. 362.  ant: Fig. 363.  ion: Fig. 364.  btibility: Fig. 36.	II F, P <sub>magn</sub> rhombohedral  43 38 ath PbO. erovskite; X-ray s of perovskite s on experiments a und to be (0.80 111) reflection, w	structure was reported by Venev-  red by Smolenskii et al. in 1958.  I P, Pmagn cubic Pm3m-Oh 37 °K  studies have not shown any ionic tructure. The magnetic peak was at 78 °K. The effective magnetic + 0.16) µR at 78 °K from the cal-	58S4 

1b

5a

Nr. 1a

3

5a

Nr.

Nr. 1a b

5a

1a	r. 1B3-iv Pb(Co <sub>1/2</sub> A synthesis of	<del> </del>	with perovsk	te structure was reported by VENEV	_ 1
b					64V3
·	( Informations o	on the dielectric a	nd magnetic p	roperties are available:	65R5
Nı	r. 1B3-v Pb(Ni <sub>1/2</sub> N	Nb <sub>1/2</sub> )O <sub>3</sub>			
1a	Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )(5 mol % BaO.	os with perovski	ite structure	was synthesized by the addition of	65\$17
Νr	. 1B3-vi Pb(In <sub>1/2</sub> N	1b <sub>1/2</sub> )O <sub>3</sub>			
la	Dielectric anom	naly in Pb(In <sub>1/2</sub> N	b <sub>1/2</sub> )O <sub>3</sub> was fou	nd by Kupriyanov and Fesenko in	<del></del>
b	phase			, and I ESEARO III	65K9
J		II II	I		
	state	(F)	P		
	crystal system	monoclinic (possibly)	cubic		65K9
	Θ	9	0 °C		
 a	a = 4.11  Å at F Dielectric consta				
Jr.	1B3-vii Pb(Yb <sub>1/2</sub> l	Nb <sub>1/2</sub> )O <sub>3</sub>			
a	Antiferroelectric	properties in Pb	(Yb <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>2</sub>	were reported by FILIP'EV et al. in	i .
ь	1963. phase	II ı	I	The Event and Their Event al. III	63F1
	state	AF	P		
- [	crystal system	monoclinic	cubic		65K9
	Θ	300, 3			
	a = 4.168  Å, b =	$= 4.107  \text{Å},  \beta = 90$	10") 'C )° 27' at RT&\		a)64T4
	Crystal structure ions were found.	: Superstructure	lines, correspo	nding to ordering of Yb³+ and Nb⁵+	
	Lattice distortion	n: Fig. 370.			64T4
- -	Thermal expansi	on: Fig. 371.			
1	Dielectric constan	nt: Fig. 372.			
	B3-viii Pb(Ho <sub>1/2</sub> I	Nb <sub>1/2</sub> )O <sub>3</sub>			
r. 1	Dielectric anomal	ly in Pb(Ho <sub>1/2</sub> Nb	<sub>1/2</sub> )O <sub>3</sub> was foun	d by Kupriyanov and Fesenco.	65K9
_	phase	II	I	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0711.7
		(A)	P	·	
	state		cubic		
	state crystal system	monoclinic		1	
r. 1	crystal system	240	°C	ı	65K9
	crystal system $\Theta$ $a = 4.160 \text{ Å}, b =$	$\frac{240}{4.106 \text{ Å}, \ \beta = 90}$			65K9
	crystal system	$\frac{240}{4.106 \text{ Å}, \ \beta = 90}$			65K9
	crystal system $\Theta$ $a = 4.160 \text{ Å}, b =$	$\frac{1}{240}$ 4.106 Å, $\beta = 90$ t: Fig. 373.		,	65K9

	phase	II (	I	- 1	
-	state	(A)	P		•
1_		monoclinic	cubic	·	
-	crystal system	270			65K9
	Θ	$= 4.093 \text{ Å}, \beta = 90$			
	a = 4.152  A, 0 Thermal expans		30 40 202		
	Dielectric consta				
•					
_	B3-x Pb(Sc <sub>1/2</sub> Ta		), was discussed	by Smolenskii et al. in 1959.	5959
a. b	phase	II I (((((((((((((((((((((((((((((((((	I		
-		F	P		5959
-	crystal system	tetragonala) (possibly)	cubic		a)59I3
-		(possibly)	°C		
-	<i>Θ</i> - /4.072 ↓ 0	$\begin{array}{c} 1 \\ 0.001) \text{ Å, } c = (4.07) \end{array}$	,	RT <sup>a</sup> ).	
-			l f annoratrus	bure lines and their great intensity	
	in Pb(Sc <sub>1/2</sub> 1a <sub>1/2</sub>	<sub>2</sub> )O <sub>3</sub> indicates tha	t the degree of o	ordering of Sc <sup>3+</sup> and Ta <sup>5+</sup> ions is	
	greater than in See 1B3-i-3.	$\operatorname{Pb}(\operatorname{Sc}_{1/2}\operatorname{Nb}_{1/2})\operatorname{O}_3.$			5913
-	Dielectric const	ant: Fig. 376.			
Nr. i	1B3-xi Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )  Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )  5 mol% SrO.		te structure was	synthesized by the addition of	65\$17
la	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) 5 mol% SrO.	O <sub>3</sub> with perovski	te structure was	synthesized by the addition of	65\$17
la	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) <sup>(1</sup> 5 mol% SrO. 1B3-xii Pb(Fe <sub>1/2</sub>	$O_3$ with perovski $(Ta_{1/2})O_3$		·	
la	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) <sup>(1</sup> 5 mol% SrO. 1B3-xii Pb(Fe <sub>1/2</sub>	$O_3$ with perovski $Ta_{1/2}O_3$ y in $Pb(Fe_{1/2}Ta_{1/2})$	O <sub>3</sub> was discovere	d by Smolenskii et al. in 1959.	65S17 59S7
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) <sup>(1</sup> 5 mol% SrO. 1B3-xii Pb(Fe <sub>1/2</sub>	$O_3$ with perovski $(Ta_{1/2})O_3$ y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )	O <sub>3</sub> was discovere	d by Smolenskii et al. in 1959.	
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/3</sub> Ferroelectricit	$O_3$ with perovski $(Ta_{1/2})O_3$ y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> ) III F, A <sub>magn</sub>	O <sub>3</sub> was discovere II F, P <sub>magn</sub>	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub>	5957
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> ) Ferroelectricity phase	O <sub>3</sub> with perovski  (Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub>	O <sub>3</sub> was discovere	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic	
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) <sup>1</sup> 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral	$O_3$ was discovered II  F, $P_{magn}$ rhombohedrala)	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> <sub>h</sub>	59S7 68N1
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) <sup>t</sup> 5 mol % SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state crystal system	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral	O <sub>3</sub> was discovere II F, P <sub>magn</sub>	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> <sub>h</sub>	59S7 68N1
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state crystal system space group $\Theta$ $P_{\delta} \parallel [111]  (produce of the phase of t$	O <sub>3</sub> with perovski  (Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143, bbably). 0.001) Å at RT.	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedrala)  133a) 243, 243, 243, 243, 243, 243, 243, 243,	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	59S7 68N1 •)65S17
Nr.	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state  crystal system space group $\Theta$ $P_{\delta} \parallel [111] \text{ (properties)}$ $a = (4.007 \pm \text{ black (dark of the state)})$	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143,  0.001) Å at RT.  range for thin sam	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedrala)  133a) 243, 243, 25  ples).	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	59S7 68N1 •)65S17
Nr.  1a b	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state crystal system space group  0  P <sub>8</sub>    [111] (pro a = (4.007 ± black (dark of the context) Crystal growt 1200 °C, cryst	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143,  0.001) Å at RT.  range for thin sam	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedrala)  133a) 243, 243, 243, 243, 243, 243, 243, 243,	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	59S7 68N1 *)65S17
Nr.  1a b	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state crystal system space group  0  P <sub>8</sub>    [111] (pro a = (4.007 ± black (dark of the context) Crystal growt 1200 °C, cryst	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143,  babably). 0.001) Å at RT.  range for thin sam h: Flux method w tals are obtained	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedrala)  133a) 243, 2  ples).  ith PbO. When the provisite.	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	59S7 68N1 •)65S17
Nr. 1a b	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) $^{\circ}$ 5 mol $^{\circ}$ 6 SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase  state  crystal system  space group $\Theta$ $P_{\mathfrak{s}} \parallel [111]  (produce a = (4.007 \pm black (dark or Crystal growt 1200 °C, crystal structy phase$	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143,  bbably). 0.001) Å at RT. cange for thin sam h: Flux method w tals are obtained ure: Disordered p	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedral <sup>a</sup> )  133 <sup>a</sup> ) 243, 2  ples).  ith PbO. When having both pyrerovskite.  ants	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	59S7 68N1 •)65S17
Nr. 11a b	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> ) Ferroelectricity phase state crystal system space group  O P <sub>8</sub>    [111] (pro a = (4.007 ± black (dark of Crystal growt 1200 °C, cryst Crystal struct phase I a II a	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143, bbably). 0.001) Å at RT. cange for thin sam h: Flux method we tals are obtained ure: Disordered p lattice const	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedrala)  133a) 243, 2  ples). ith PbO. When having both pyrerovskite. ants Å at RT. Å at 90 °K	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	59S7 68N1 •)65S17
Nr. 11a b	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) $^{\circ}$ 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> )  Ferroelectricity phase state crystal system space group $\Theta$ $P_{\delta} \parallel [111]  (production of the production of the phase of th$	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  F, A <sub>magn</sub> rhombohedral  143,  0.001) Å at RT.  range for thin sam  h: Flux method we tals are obtained  ure: Disordered p  lattice const  = (4.007 ± 0.001)  = (4.006 ± 0.001)  = 89.89° ± 0.02°	O <sub>3</sub> was discovered II  F, P <sub>magn</sub> rhombohedral <sup>a</sup> )  133 <sup>a</sup> ) 243, 2  ples).  ith PbO. When having both pyrerovskite.  ants  Å at RT.  Å at 90 °K	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	68N1 •)65S17
Nr. 11a b 2a 3	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )' 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/i</sub> )  Ferroelectricit: phase state crystal system space group  \[ \textit{\textit{\textit{\textit{Phase}}}} \] \[ \textit{\textit{\$\textit{Phase}}} \] \[ \textit{\$\textit{\$\textit{\$\textit{Phase}}} \] \[ \$\textit{\$\te	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  III  F, A <sub>magn</sub> rhombohedral  143,  0.001) Å at RT.  range for thin sam  h: Flux method w  tals are obtained  ure: Disordered p  lattice const  = (4.007 ± 0.001)  = 89.89° ± 0.02°  estant: Fig. 377, 3	II F, P <sub>magn</sub> rhombohedral <sup>a</sup> )  133 <sup>a</sup> )  243, 2  ples). ith PbO. When having both pyrerovskite. ants Å at RT. Å at 90 °K	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	68N1 •)65S17
Nr. 1a b 2a 3 4	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> ) 5 mol% SrO.  1B3-xii Pb(Fe <sub>1/2</sub> ) Ferroelectricity phase state crystal system space group  P <sub>8</sub>    [111] (property a = (4.007 ± black (dark or 1200 °C, cryster) Crystal structy phase I a II a II a C Spontaneous II dagnetic sus II Magnetic sus	Ta <sub>1/2</sub> )O <sub>3</sub> y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  y in Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )  F, A <sub>magn</sub> rhombohedral  143,  0.001) Å at RT.  range for thin sam  h: Flux method we tals are obtained  ure: Disordered p  lattice const  = (4.007 ± 0.001)  = (4.006 ± 0.001)  = 89.89° ± 0.02°	II F, P <sub>magn</sub> rhombohedrala)  133a)  243, 2  ples). ith PbO. When having both pyrerovskite. ants Å at RT. Å at 90 °K  78. 379.	d by Smolenskii et al. in 1959.  I P, P <sub>magn</sub> cubic Pm3m-O <sup>1</sup> 233a) °K	68N1 •)65S17

1T4

K9

5K9

·8S3

7a 9a

14a

Nr.

2a

Nr.

Nr.

2a 5a

	A synthesis of	Pb(Co <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub>	with perovskite	estructure was reported by Shvorne			
	and VENEVIS	EV. The compo	und was stabiliz	estructure was reported by Shvorne and by the addition of 1 mol% Lag	O <sub>3</sub> . 65S17		
N	r. 1B3-xiv Pb(Yb <sub>1</sub>	$_{1/2}{ m Ta}_{1/2}){ m O}_{3}$					
1a	Dielectric anomaly in Pb(Yb <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub> was reported by Isupov and Kranik in 1964. 6416						
b	phase	II	I	forted by Isupov and Kranik in 196	64. 6416		
	state	(A)	F				
	crystal system	monoclinic	cubic				
	Θ	280	), 285°) °C				
	a = 4.154  Å, b	$= 4.108 \text{ Å}, \beta =$	90° 30' at RT.		a)65K9		
<del>1</del> 	Thermal expan	sion: Fig. 381.					
ба	Dielectric const	tant: Fig. 382.					
Nr.	1B3-xv Pb(Lu <sub>1/2</sub>	Ta <sub>1/2</sub> )O,			,		
a			T- 10				
	SKAYA in 1958.	nary III PD(Lu <sub>1/2</sub>	$(1a_{1/2})O_3$ was fo	ound by Smolenskii and Agranov	7-   5000		
Ь	phase	II	I		58S3		
	state	(A)	P				
	crystal system	monoclinic	cubic		65K9		
	Θ		80 °C		ON		
	a = 4.153  Å, b = 1.153  Å	$= 4.107 \text{ Å}, \beta = 9$	90° 30' at RT.				
	Lattice distortion Thermal expansion	on: Fig. 383. ion: Fig. 384					
	Dielectric consta	int: Fig. 385.					
[r 1	Dielectric consta						
	lB3-xvi Pb(Fe <sub>1/2</sub> V	V <sub>1/2</sub> )O <sub>3</sub>					
1	lB3-xvi Pb(Fe <sub>1/2</sub> V	$V_{1/2}$ ) $O_3$	with perovskite	structure was reported by Veney-			
1	A synthesis of P	V <sub>1/2</sub> )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> v		structure was reported by Venev-			
.	A synthesis of P	V <sub>1/2</sub> )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> v		structure was reported by Venevence of the spinel phase in a sample	64V3		
Ir.	A synthesis of P TSEV et al. The magnetic me of this composition	V <sub>1/2</sub> )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> veasurements conson.	firmed the prese				
r. 1	A synthesis of P TSEV et al. The magnetic me of this composition B3-xvii Pb(Li <sub>1/4</sub> N	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> veasurements conson. Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and	firmed the prese	ence of the spinel phase in a sample	64V3		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub>	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> versurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consolor.  Pb(Zn. Pb(Zn.	sister crystals	ence of the spinel phase in a sample	64V3		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub>	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> veasurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite colony Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(C	sister crystals  ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized: Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>2</sub>	64V3 65R5		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> )	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> veasurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consology Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1</sub> )	sister crystals ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Ta <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>2</sub>	64V3 65R5		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> )  Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> )	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> versus remembers conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consolors	sister crystals  ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized: Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>2</sub>	64V3 65R5		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> )	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> versus remembers conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consolors	sister crystals ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Ta <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>2</sub>	64V3 65R5		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> )	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> veasurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consonsite perovskite consolors, Pb(Zn <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Zn <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2	sister crystals ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Ta <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Sc <sub>1/4</sub> Cr <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	64V3 65R5		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb 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<sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub>	$W_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> value assurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consolors points of the perovskite consolors points	sister crystals ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Ta <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>2</sub>	64V3 65R5 64V3 65V3		
r. 1	A synthesis of PTSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/4</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/4</sub> B4-i Pb(Mg <sub>1/3</sub> Nb <sub>2</sub> Ferroelectricity in SKAYA in 1958.	$V_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> veasurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consonsite perovskite consolors, Pb(Zn <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Zn <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2)O <sub>3</sub> Pb(Mg <sub>1</sub> , 1/2	sister crystals ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Ta <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Sc <sub>1/4</sub> Cr <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	64V3 65R5		
r. 1	A synthesis of P TSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1</sub> Pb(Mg <sub>1/3</sub> Nb <sub>2</sub> Ferroelectricity in SKAYA in 1958.	$W_{1/2}$ )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> value assurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consolors points of the perovskite consolors points	sister crystals ompounds conta (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> Na <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> (4Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Sc <sub>1/4</sub> Cr <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	64V3 65R5 64V3 65V3		
r. 1	A synthesis of PTSEV et al.  The magnetic me of this composition  B3-xvii Pb(Li <sub>1/4</sub> N  Following composition  Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> Pb(Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/4</sub> Nb <sub>1/4</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/4</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/4</sub> B4-i Pb(Mg <sub>1/3</sub> Nb <sub>2</sub> Ferroelectricity in skaya in 1958.  phase  state  crystal system	V <sub>1/2</sub> )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> value assurements conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite conson.  Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O 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<sub>1/2</sub> )O <sub>3</sub> Pb(Sc <sub>1/4</sub> Cr <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	64V3 65R5 64V3 65V3		
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Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> and site perovskite consolors Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Zn <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O <sub>3</sub> Pb(Mg <sub>1/2</sub> )O 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<sub>2</sub> )O <sub>3</sub> (5) O <sub>3</sub> was discover  I P ubic 3m-O <sub>h</sub>	ence of the spinel phase in a sample aining Pb were synthesized:  Pb(Co <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Ni <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Cd <sub>1/4</sub> Mn <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Sc <sub>1/4</sub> Cr <sub>1/4</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	64V3 65R5 64V3 65V3		

a	Crystal growth: F Kyropoulos meth		(using PbO).	59M5 67B18					
_ -	Crystal structure: Disordered perovskite.								
_ -	Thermal expansion								
	Dielectric constant: Fig. 387, 388, 389.								
b	Nonlinear dielectric properties: $E = [(T - \Theta_p) (\epsilon_0 C)^{-1}] P + \xi P^3 + \zeta P^5 + \cdots$ , where $\Theta_p = 265$ °K, $C = (3.7 \pm 1.0) \cdot 10^5$ °K, and $\xi \approx 5.6 \cdot 10^8$ V m <sup>5</sup> C <sup>-3</sup> .								
c	Spontaneous polarization and coercive field: Fig. 390.								
${a}$	Piezoelectricity: Fig. 391.								
)a	Refractive index: $n = 2.56$ for 6328 Å at 299 °K. Birefringence: It was found that the crystals $Pb(Mg_{1/3}Nb_{2/3})O_3$ behave like optically isotropic crystals. An applied electric field causes double refraction. Fig. 392.								
e	Quadratic electrooptic effect: $M_{11} - M_{12} = +0.015 \mathrm{m^4  C^{-2}},  M_{44} = +0.008 \mathrm{m^4  C^{-2}}$ for 6328 Å at 299 °K.								
la	Domain structure: Clear domains were observed only in very thin wafers (e. g., $20 \cdot 10^{-6}$ m).								
	ana :: ni./7- Nie								
Nt. I	1B4-ii Pb(Zn <sub>1/3</sub> Nb								
1a	Ferroelectric Pb(Zn <sub>1/3</sub> Nb <sub>2/3</sub> )O <sub>3</sub> crystal was synthesized by Bokov and Myl'nikova in 1960.		•	60B7					
b	phase		I						
	state	F	P						
	crystal system		cubic	60B7					
	$\Theta$ 140 °C $a = 4.04 \text{ Å at RT.}$ light yellow.								
2a	Crystal growth: Flux method with PbO. The crystals were separated from the matrix solution by washing in acetic acid at RT for a long time.								
	Dielectric constant: Fig. 393.								
5a									
5a	protective company								
5a	Picicottic consta								
	1B4-iii Pb(Cd <sub>1/3</sub> N	[b <sub>2/3</sub> )O <sub>3</sub>		·					
	1B4-iii Pb(Cd <sub>1/3</sub> N		$_{/3}{ m Nb}_{2/3}{ m O}_3$ was reported by Venevtsev et al. in 1966.	65T5, 661					
Nr.	1B4-iii Pb(Cd <sub>1/3</sub> N		/3Nb <sub>2/3</sub> )O <sub>3</sub> was reported by Venevtsev et al. in 1966.	65T5, 661					
<b>Nr.</b> 1b	1B4-iii Pb(Cd <sub>1/3</sub> N	aly in Pb(Cd <sub>1</sub>	$_{/3}{ m Nb}_{2/3}){ m O}_3$ was reported by Venevtsev et al. in 1966.	65T5, 661					
<b>Nr.</b> 1b	1B4-iii Pb(Cd <sub>1/3</sub> N Dielectric anoma	aly in Pb(Cd <sub>1</sub>	132.02/37.03	·					
<b>Nr.</b> 1b	1B4-iii Pb(Cd <sub>1/3</sub> N Dielectric anoma	aly in Pb(Cd <sub>1</sub>	$_{/3}{ m Nb}_{2/3}{ m )O}_3$ was reported by Venevtsev et al. in 1966. ${ m b}_{2/3}{ m )O}_3$ was found by Bokov and Myl'nikova in 1960.	60B7					
Nr. 1b	1B4-iii Pb(Cd <sub>1/3</sub> N Dielectric anoma	aly in Pb(Cd <sub>1</sub>	b <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.	· · · · · · · · · · · · · · · · · · ·					
Nr. 1b Nr. 1a	1B4-iii Pb(Cd <sub>1/3</sub> N  Dielectric anoma  1B4-iv Pb(Co <sub>1/3</sub> N  Ferroelectricity	aly in Pb(Cd <sub>1</sub> (b <sub>2/3</sub> )O <sub>3</sub> in Pb(Co <sub>1/3</sub> N	$b_{2/3})O_3$ was found by Bokov and Myl'nikova in 1960.						
Nr. 1b Nr. 1a	1B4-iii Pb(Cd <sub>1/3</sub> N  Dielectric anoma  1B4-iv Pb(Co <sub>1/3</sub> N  Ferroelectricity phase	aly in Pb(Cd <sub>1</sub> (b <sub>2/3</sub> )O <sub>3</sub> in Pb(Co <sub>1/3</sub> N	b <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.	· · · · · · · · · · · · · · · · · · ·					
Nr. 1b Nr. 1a	1B4-iii Pb(Cd <sub>1/3</sub> N  Dielectric anoma  1B4-iv Pb(Co <sub>1/3</sub> N  Ferroelectricity phase state	aly in Pb(Cd <sub>1</sub> (b <sub>2/3</sub> )O <sub>3</sub> in Pb(Co <sub>1/3</sub> N	b <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.  I P	60B7					
Nr. 1b Nr. 1a	1B4-iii Pb(Cd <sub>1/3</sub> N  Dielectric anoma  1B4-iv Pb(Co <sub>1/3</sub> N  Ferroelectricity phase state crystal system	in Pb(Cd <sub>1</sub> (b <sub>2/3</sub> )O <sub>3</sub> in Pb(Co <sub>1/3</sub> N II F	b <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.  I P cubic	60B7					
Nr. 1b Nr. 1a	1B4-iii Pb(Cd <sub>1/3</sub> N  Dielectric anoma  1B4-iv Pb(Co <sub>1/3</sub> N  Ferroelectricity phase state crystal system space group	ib <sub>2/3</sub> )O <sub>3</sub> in Pb(Co <sub>1/3</sub> N II F	b <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.    I P cubic   Pm3m-O <sub>h</sub>	60B7					
Nr. 1b Nr. 1a	1B4-iii Pb(Cd <sub>1/3</sub> N  Dielectric anoma  1B4-iv Pb(Co <sub>1/3</sub> N  Ferroelectricity phase state crystal system space group  Θ  a = 4.04 Å at H brown.	in Pb(Cd <sub>1</sub> (b <sub>2/3</sub> )O <sub>3</sub> in Pb(Co <sub>1/3</sub> N  II  F	b <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.    I	60B7					

53, 5956

B5, 60S7 57B9

1B18

1a	Ferroelectricit SKAYA in 1958	y in Pb(Ni <sub>1/3</sub>	Nb <sub>2/3</sub> )O <sub>3</sub> was discovered by Smolenskii and Agranov	- 58S3, 59S6						
b	phase II I									
	state									
	crystal system		cubic							
	space group		Pm3m-Oh	61B5, 60S						
	Θ		153 °K							
	a = 4.03  Å at yellowish green	RT. $\varrho = 8.5$	5 · 10³ kg m <sup>-3</sup> .	59M5						
<b>2</b> a	Crystal growth	: Flux metho	ed with PbO.	-						
3	Crystal structu			59M5						
4	Thermal expan		<del></del>	59M5						
 5a				61B5						
	Dielectric const		, 397, 398.							
9a	Birefringence:	Fig. 399.								
Vr.	1B4-vi Pb(Mg <sub>1/3</sub>	${ m Ta}_{2/3}){ m O}_3$		'						
a			a <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.							
b	phase	II	Section 1960.	60B7						
	state	F	P							
	crystal system		cubic							
	space group		Pm3m-Oh							
	Θ			60B7						
	a = 4.02  Å at R light yellow.									
a	Crystal growth:	Flux method	with PbO							
	Crystal structure			60B7						
1	Dielectric consta		perovskite.	60B7						
•										
_	B4-vii Pb(Co <sub>1/3</sub> T	_								
1	Ferroelectricity i	n Pb(Co <sub>1/3</sub> Ta	<sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.	60B7						
}  -	pnase	II	I							
-	state	F	P							
_	crystal system		cubic							
-	space group		Pm3m-O <sub>b</sub>	60B7						
	$\Theta$ $a = 4.01 \text{ Å at RT}$ brown.	— <b>1</b> 4	10 °C	·						
-		Numer and the state of the stat								
	Crystal growth: F	iux inethod v		60B7						
	Crystal structure:	<b>.</b> .								

b

5a 10 11

Nr.

2a

11

12b

1C Nr.

5a

6a 7a

$ \tau$	B4-viii Pb(Ni <sub>1/3</sub> T		()O was four	nd by Bokov and Myl'nikova in 1960	. 60B7					
a	Ferroelectricity in Pb(Ni <sub>1/3</sub> Ta <sub>2/3</sub> )O <sub>3</sub> was found by Bokov and Myl'nikova in 1960.									
b  -	phase	F P								
-	state	F P cubic								
]_	crystal system									
]_	space group		Pm3m-Oh							
	Θ	—18 —	80 °C							
	$a = 4.01 \text{ Å at R}^2$ green.	Γ.								
a	Crystal growth:	Flux method.			60B7					
- -	Crystal structure	: Disordered	perovskite.		$-\frac{60B7}{}$					
a  -	Dielectric consta				ļ					
Jr. 1	1B5-i Pb(Mn <sub>2/3</sub> W <sub>1</sub>			W 10 Alla Pooveyay	. 1					
la	Dielectric and meet al. in 1965.	agnetic anoma	alies in Pb(Mn	$_{1/3}W_{1/3}O_3$ were reported by Roginskay	65R5					
ь	phase	III	ļ II	Į I						
	state	(A), (A <sub>magn</sub>	(A), P <sub>m</sub>	P, P <sub>magn</sub>						
		/, (magn	monocli		65R5					
	crystal system	203 473 °K								
	$\Theta$   203 473 $R$ $a = c = 4.098 \text{ Å}, b = 4.014 \text{ Å}, \beta = 90^{\circ} 23' \text{ at RT}.$									
_	a = c = 4.098  B Dielectric consta		2, P							
5a										
<u>_</u>	$\sigma = 2 \cdot 10^{11} \Omega^{-1}$		2: 402		65R5					
1		tibility: see I °K.	Fig. 403.		65R5					
1 Nr.	Magnetic suscep $\Theta_{p \text{ magn}} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W	tibility: see I °K. <sub>1/3</sub> )O <sub>3</sub>		covered by Smolenskii et al. in 1959.	5987					
Nr.	Magnetic suscep $\Theta_{p magn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity	tibility: see I °K. <sub>1/3</sub> )O <sub>3</sub>		covered by Smolenskii et al. in 1959.						
Nr.	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase	tibility: see H °K. <sub>1/3</sub> )O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W	7 <sub>1/3</sub> )O <sub>3</sub> was dis	covered by Smolenskii et al. in 1959.  I P, P <sub>magn</sub>						
1 Nr. 1a	Magnetic suscep $\Theta_{p magn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase state	tibility: see H $^{\circ}$ K. $_{1/3}$ )O $_{3}$ in Pb(Fe $_{2/3}$ W	7 <sub>1/3</sub> )O <sub>3</sub> was dis	1						
1 Nr. 1a	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase state crystal system	tibility: see H °K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub>	$(I_{1/3})O_3$ was dis $II$ $P, A_{magn}$ cubic	P, P <sub>magn</sub>	5957					
1 Vr. 1a	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase state crystal system $\Theta$	tibility: see H °K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub>	$V_{1/3}$ )O <sub>3</sub> was dis	P, P <sub>magn</sub>	5957					
Nr.  1a b	Magnetic suscep $\Theta_{p  magn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W)  Ferroelectricity phase state crystal system $\Theta$ $a = 4.02  \text{Å}$ at I	tibility: see H  *K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1'  RT.	$(I_{1/3})O_3$ was dis $II$ $P, A_{magn}$ cubic	P, P <sub>magn</sub>	59S7 62B7					
Nr.	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W)  Ferroelectricity phase state crystal system $\Theta$ $a = 4.02 \text{ Å at I}$ Flux method (F	tibility: see H °K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1'  RT.  PbO).	$I_{1/3}$ )O <sub>3</sub> was dis II P, A <sub>magn</sub> cubic 78	P, P <sub>magn</sub>	59S7 62B7 65R5					
1 Nr. 1a b	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W)  Ferroelectricity phase state crystal system $\Theta$ $a = 4.02 \text{ Å at I}$ Flux method (For Dielectric constonal Magnetic susception of the susception of t	tibility: see H  *K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1'  RT.  PbO).  ant: Fig. 404  ptibility: see is a linear fun	7 <sub>1/3</sub> )O <sub>3</sub> was dis  II  P, A <sub>magn</sub> cubic  78  36  Fig. 404.  action of the m	P, P <sub>magn</sub>	59S7 62B7 65R5					
1 Nr. 1a b	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W)  Ferroelectricity phase state crystal system $\Theta$ $a = 4.02 \text{ Å at I}$ Flux method (Foundation in Effective magnetic susception in Effective	tibility: see H  K.  1/3)O3  in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1  RT.  PbO).  ant: Fig. 404 ptibility: see is a linear function etic moment:	7 <sub>1/3</sub> )O <sub>3</sub> was dis  II  P, A <sub>magn</sub> cubic  78  36  Fig. 404.  action of the m	P, P <sub>magn</sub> cubic 33 °K	59S7 62B7 65R5 62B7					
1 Nr. 1a b	Magnetic suscep $\Theta_{pmagn} = -75$ 1B5-ii Pb(Fe <sub>2/3</sub> W)  Ferroelectricity phase state  crystal system $\Theta$ $a = 4.02 \text{ Å at I}$ Flux method (Foundation of the constant of	in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> TCT.  PbO).  ant: Fig. 404  ptibility: see is a linear function moment:	$V_{1/3}$ )O <sub>3</sub> was dis II P, A <sub>magn</sub> cubic 78 36 Fig. 404. action of the magnature o	P, P <sub>magn</sub> cubic  33 °K  magnetic field intensity up to 8000 Oe.	59S7 62B7 65R5 62B7					
1 Nr. 1a b 2a 5a 11 12b 1C	Magnetic suscep  Θ <sub>pmagn</sub> = -75  1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase state crystal system  Θ a = 4.02 Å at I  Flux method (I  Dielectric const  Magnetic suscee Magnetic suscee Magnetic suscee Magnetic suscee Magnetic suscee Magnetic suscee Selfective magn ESR: Fig. 405.	tibility: see H  *K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1  RT.  PbO).  ant: Fig. 404  ptibility: see is a linear function etic moment:  with perove	II P, A <sub>magn</sub> cubic 78 36 Fig. 404. action of the magn	P, P <sub>magn</sub> cubic 33 °K	59S7 62B7 65R5 62B7					
1 Nr. 1a b 2a 5a 11 12b 1C Nr 1b	Magnetic suscep  Θ <sub>pmagn</sub> = -75  1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase state crystal system  Θ a = 4.02 Å at I Flux method (I Dielectric const Magnetic suscey Magnetic	tibility: see H  *K.  1/3)O <sub>3</sub> in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1'  RT.  PbO).  ant: Fig. 404  ptibility: see is a linear function moment:  with perove  KNbO <sub>3</sub> : Fig. 406, 406, 406, 406  eters: Fig. 406, 406	Fig. 404. action of the market 4.2 μ <sub>B</sub> . skite-type ox	P, P <sub>magn</sub> cubic 33 °K  magnetic field intensity up to 8000 Oe.	59S7 62B7 65R5 62B7					
1a b  2a 5a 11  12b  1C  Nr	Magnetic suscep  Θ <sub>pmagn</sub> = -75  1B5-ii Pb(Fe <sub>2/3</sub> W  Ferroelectricity phase state crystal system  Θ a = 4.02 Å at I Flux method (I Dielectric const Magnetic suscey Magnetization i Effective magn ESR: Fig. 405.  C Solid solutions T. 1C-a1 NaNbO <sub>3</sub> - Phase diagram Lattice parame Dielectric cons Polarization ar	tibility: see H  *K.  1/3)O3  in Pb(Fe <sub>2/3</sub> W  III  F, A <sub>magn</sub> 1'3T.  PbO).  ant: Fig. 404  ptibility: see is a linear function moment:  with perove KNbO3  : Fig. 406, 406  tant: Fig. 410  and coercive field	1/ <sub>3</sub> )O <sub>3</sub> was dis  II  P, A <sub>magn</sub> cubic  78  36  Fig. 404.  action of the magn of the m	P, P <sub>magn</sub> cubic 33 °K  magnetic field intensity up to 8000 Oe.	59S7 62B7 65R5 62B7					

Nr.

Tab

Poly

Sing

Nr.

Nr.

Tab. 59. (Na <sub>1-x</sub> K	$(x_x)$ NbO <sub>3</sub> . Transit [54S3]	tion energy	' ∆Q <sub>m</sub> .		$(Na_{0.5}K_{0.5})NbO_3$ (ceretromechanical cons	amics). Electric an tants. [59E1]
x	Lower phase change	Upper p		Dielectric Dissipation	constant (100 kHz) n factor (100 kHz)	290 ≈4.0%
1.00 (KNbO <sub>3</sub> ) 0.10 0 (NaNbO <sub>3</sub> )	85 cal/mole 20 cal/mole —	190 cal/n 60 cal/n 50 cal/n	nole	Specific re Density e Poisson's r Coupling f Frequency Mechanica Young's m Piezoelectr Piezoelectr	ratio (assumed) ratio (assumed) ratio (assumed) ratio (assumed) ratio ( $k_p$ constant $f_R r$ $l Q_{mech}$ (radial) ratio constant $-d_{31}$ ric constant $-g_{31}$ ric constant $d_{33}^*$ ric constant $e_{33}^*$	$\begin{array}{c} 10^{10}  \Omega_{\rm m} \\ 4.25 \cdot 10^3  {\rm kg \ m^{-3}} \\ 0.27 \\ 0.34 \cdot \cdot \cdot 0.39 \\ 1.67  {\rm kHz \ m} \\ 130 \\ 1.04 \cdot 10^{11}  {\rm N \ m^{-2}} \\ 32 \cdot 10^{-12}  {\rm C \ N^{-1}} \\ 12.6 \cdot 10^{-3}  {\rm m^2 \ C^{-1}} \\ 80 \cdot 10^{-12}  {\rm C \ N^{-1}} \\ 31.5 \cdot 10^{-3}  {\rm m^2 \ C^{-1}} \\ 0.51 \end{array}$
Nr. 1C-a2 NaNbC	O <sub>3</sub> -NaTaO <sub>3</sub>	1b Phas	se diag ice par	ram: Fig. 418 ameters: Fig	3. . 419.	
	<del>-</del>			pansion: Fig		
				onstant: Fig.	421.	
	·	9a   Biref	ringen	ce: Fig. 422.		
Nr. 1C-a3 NaNbO	<sub>3</sub> -NaSbO <sub>3</sub>	la   Curie	tempe	erature: Fig.	423.	
Nr. 1C-a4 KNbO <sub>3</sub> -	KTaO <sub>3</sub>	Phase	e diagr	am: Fig. 424	, 425.	
		5a   Diele	ctric p	roperties: Fig		
	_		ee Tab		400	
					428; Tab. 61. perties of K(Ta <sub>0.35</sub> N	
	рошι, π.	constant i	n the	formula for $P_{m{s}}$ calculated	eat, $\Theta_{\mathbf{f}}$ : Curie free energy = d for $T = \Theta_{\mathbf{f}}$ .	
	<i>x</i>   c	$L$ al mol $^{-1}$	<b>0</b> f °K	10 <sup>5</sup> °K <sup>-1</sup>	P <sub>calc</sub> 10 <sup>-2</sup> C m <sup>-2</sup>	,
	0.12   1	$ \begin{array}{cccc} 0 & \pm & 10 \\ 6 & \pm & 4 \\ 0 & \pm & 2 \\ 4.0 & \pm & 2 \end{array} $	679 656 623 591	2.6 2.7 2.85 3.05	27 17.7 7.9 5.1	
Nr. 1C-a5 K(Ta <sub>0.35</sub> N For general properti	Nb <sub>0.65</sub> )O <sub>3</sub> (KTN) es of KNbO <sub>3</sub> -K7	ΓaO <sub>3</sub> see 10	C- <b>a</b> 4.			
	91			tance: Fig. 42		
	C	l   Farada	ay rota	tion: Fig. 43	0. See also Tab. 44.	
Nr. 1C-a6 CaTiO <sub>3</sub> -S	rTiO <sub>3</sub> 11		diagra:	m: Fig. 431, eneters: Fig. 4	432, 433. 34.	
	5a			nstant: Fig. 4		
	С			polarization:		
Sr. 1C-a7 CaTiO <sub>3</sub> -B	aTiO <sub>3</sub> 1b	Phase Lattice	diagrai paran	m : Fig. 438, 4 neters : Fig. 4	139, 440. 41	
	5a	_		stant: Fig. 4		
	6b			luctivity: Fig		
	7a				y: Tab. 62. See Fig.	183 and Tab. 40.
Estimated values.					J	

Tab. 6	2. (Ba <sub>1-x</sub> Ca <sub>2</sub>	,)TiO <sub>3</sub> (ceram	ics, pure Ba	$\Gamma iO_3$ base). $d$	$a_{31}$ and $d_{33}$ at	RT. [57B4]
x	<i>θ</i> 10³ kg m−3	€x 10 <sup>8</sup> kg m <sup>-3</sup>	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$-d_{33}/d_{31}$	Porosity $(1 - (\varrho/\varrho_{\mathbf{X}}))$
0 0.05 0.07 0.09 0.12	5.85 5.70 5.68 5.65 5.55	6.017 5.85 5.80 5.74 5.66	-97.5 -66.6 -58.0 -52.1 -43.4	229 167 150 139 124.5	2.35 2.51 2.58 2.67 2.88	0.028 0.026 0.021 0.016 0.019

Nr. 1C-a8 CaTiO<sub>3</sub>-PbTiO<sub>3</sub>

Curie temperature: Fig. 445. 1b Lattice parameter: Fig. 446.

Nr. 1C-a9 SrTiO3-BaTiO3

Phase diagram: Fig. 447 ··· 450. 1b Lattice parameter: Fig. 451; see Fig. 448. 5a Dielectric constant: Fig. 452. Microwave dielectric loss: Tab. 63.

Specific heat: Fig. 453. 6a

Conductivity associated with doping: Fig. 454, 455, 456. 10b

Tab. 63.  $(Ba_{1-x}Sr_x)TiO_3$ . Dielectric loss:  $\alpha$ ,  $\beta$ ,  $\gamma$  at 20 GHz. [62R4].  $(T-\Theta_p)\tan\delta = \alpha + \beta T + \gamma T^2$ .

Sam	ple	Heat treatment	Grain size µ	<b>Θ</b> <sub>p</sub> °K	°K	β·104	γ·10 <sup>6</sup> (°K) <sup>-1</sup>
Polycristalline	SrTiO <sub>3</sub>	Hot pressed and fired in air at 900 °C for 10 h	1	37	0.33	7.7	4.3
		Refired at 1200 °C in air for 10 h	3	37	0.26	5.5	4.7
		Refired at 1400 °C in air	15	37	0.17	4.4	4.2
		Refired at 1500 °C in O <sub>2</sub> for 6 h	30	37	0.08	4.5	3.7
	$Ba_{0.2}Sr_{0.8}TiO_3$	Hot pressed and fired in O <sub>2</sub> at 1500 °C for 10 h	30	105	0.6	9	2.5
	Ba <sub>0.5</sub> Sr <sub>0.5</sub> TiO <sub>3</sub>	Hot pressed and fired in O <sub>2</sub> at 1500 °C for 10 h	30	218	2.0	(9)a)	(2.5)
	Ba <sub>0.7</sub> Sr <sub>0.3</sub> TiO <sub>3</sub>	Ceramic fired to 1375 °C	8	280	2.2	(9)	(2.5)
	$Ba_{0.8}Sr_{0.2}TiO_3$	in air for 1 h Ceramic fired to 1300 °C in air for 1 h	8	324	1.6	(9)	(2.5)
Single crystal	SrTiO <sub>3</sub> SrTiO <sub>3</sub> +0.1% Gd <sup>3+</sup> SrTiO <sub>3</sub> +0.03% Fe <sup>3+</sup>	None None None	∞ ∞ ∞	37 37 37	0 0.033 0.043	6.53 (6.53) (6.53)	2.54 (2.54) (2.54)

Curie temperature: Fig. 457. Nr. 1C-a10 SrTiO<sub>3</sub>-PbTiO<sub>3</sub> 1b Lattice parameter: Fig. 458.

Dielectric constant: Fig. 459. 5a Curie constant: Fig. 460.

Transition heat: Fig. 461. 6a

Nr. 1C-a11 BaTiO<sub>3</sub>-PbTiO<sub>3</sub>

ab. 40.

Phase diagram: Fig. 462. 1b Lattice parameter: Fig. 463. Dielectric constant: Fig. 464. 5a

Specific heat: Fig. 465. Transition heat: Fig. 466. 6a

Electromechanical properties: see 1A-8. 7

Radiation damage: Fig. 467. 16

 $<sup>^{</sup>a}$ ) Values in parentheses indicate that these values were assumed in order to determine  $\alpha$ .

Nr.

Nr.

Nr.

Pb(: elec

2

5a

Nr. 1C-a12 CaZrO <sub>3</sub> -BaZrO <sub>3</sub>	1b	Lattice parameter: Fig. 468.
Nr. 1C-a13 CaZrO <sub>3</sub> -PbZrO <sub>3</sub>	1b	Phase diagram: Fig. 469.
	4	Thermal expansion: Fig. 470.
	5a	Dielectric constant: Fig. 471.
Nr. 1C-a14 SrZrO <sub>3</sub> -PbZrO <sub>3</sub>	1b	Phase diagram: Fig. 472, 473. Lattice parameter: Fig. 474.
	4	Thermal expansion: Fig. 475, 476, 477; Tab. 64.
	5a	Dielectric constant: Fig. 478, 479.
	c	Polarization: Fig. 480.
	6a	Specific heat: Fig. 481. Transition heat: Tab. 65.

Tab. 64. PbZrO<sub>3</sub>,  $(Pb_{0.95}Sr_{0.05})ZrO_3$ , and  $(Pb_{0.925}Ba_{0.075})ZrO_3$ .  $\Delta V/V$ .  $\Delta V$ : anomalous volume change at the transition point. [54S2]

Composition	$\Delta V/V$ [10-4]							
	Lowest phase	Intermediate phase						
PbZrO <sub>3</sub> (Pb <sub>0.925</sub> Ba <sub>0.075</sub> )ZrO <sub>3</sub> (Pb <sub>0.95</sub> Sr <sub>0.05</sub> )ZrO <sub>3</sub>	-41 at 230 °C -43 at 150 °C -30 at 210 °C	+24 at 190 °C -20 at 230 °C						

Tab. 65.  $PbZrO_3$ ,  $(Pb_{0.95}Sr_{0.05})ZrO_3$ , and  $(Pb_{0.925}Ba_{0.075})ZrO_3$ .  $\Delta Q_m$ . [52S2]

Composition	$\Delta Q_{\rm m}$ [o Lower transition	cal mol <sup>-1</sup> ] Upper transition			
PbZrO <sub>3</sub>	-	440			
$(Pb_{0.925}Ba_{0.075})ZrO_3$	190	230			
$(\mathrm{Pb_{0.95}Sr_{0.05})ZrO_3}$	180	230			

Nr. 1C-a15 BaZrO <sub>3</sub> -PbZrO <sub>3</sub>	1b   Phase diagram: Fig. 482. Lattice parameter: Fig. 483.
	4 Thermal expansion: Fig. 484.
	5a Dielectric constant: Fig. 485 ··· 488.
	c Coercive field: Fig. 489.
	8   Elastic properties: Fig. 490.
Nr. 1C-a16 CaHfO <sub>3</sub> -PbHfO <sub>3</sub>	1b Phase diagram: Fig. 491.
1	5a   Dielectric constant: Fig. 492.
Nr. 1C-a17 SrHfO <sub>3</sub> -PbHfO <sub>3</sub>	1b Phase diagram: Fig. 493.
	5a   Dielectric constant: Fig. 494.
Nr. 1C-a18 BaHfO <sub>3</sub> -PbHfO <sub>3</sub>	1b   Phase diagram: Fig. 495.
Nr. 1C-a19 CaSnO <sub>3</sub> -SrSnO <sub>3</sub>	1b   Lattice parameter: Fig. 496.
Nr. 1C-a20 BaSnO <sub>3</sub> -SrSnO <sub>3</sub>	1b   Lattice parameter: see Fig. 496.
Nr. 1C-a21 BaSnO <sub>3</sub> -PbO:SnO <sub>2</sub>	1b   Phase diagram: Fig. 497.
	5a Dielectric constant: Fig. 498.
Nr. 1C-a22 CaTiO <sub>3</sub> -CaZrO <sub>3</sub>	1b   Lattice parameter: Fig. 499.

Nr. 1C-	-a23 BaTiO <sub>3</sub> -BaZrO <sub>3</sub>	1b	Phase diagram: Fig. 500.  Lattice parameter: Fig. 501.	
		2a	Phase diagram: Fig. 502.	
		5a	Dielectric constant: Fig. 503.	
		8a	Elastic property: Fig. 504	
Nr. 1C-	-a24 BaTiO <sub>3</sub> -BaHfO <sub>3</sub>	1b	Phase diagram: Fig. 505. Lattice parameter: Fig. 506.	
		5a	Dielectric constant: Fig. 507.	
N: 1C	-a25 BaTiO <sub>3</sub> -BaSnO <sub>3</sub>	1b	Phase diagram: Fig. 508. See also	5912
Nr. IC.	-225 Da 1103-Daono3		Phase diagram: Fig. 509.	
		4	Thermal expansion: Fig. 510.	
			Dielectric constant: Fig. 511.	1
	C-a26 BaTiO <sub>3</sub> -BaUO <sub>3</sub>		Lattice parameter: Fig. 512.	
Nr. 1C	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $Ti_{1-x}$ )O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28.	·· 0.6;	for electromechanical properties of these very imp	52S6, 52S4
Nr. 1C Pb(Zr <sub>x</sub> electric	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $Ti_{1-x}$ O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28. Ferro- and antiferroelective revealed in 1952 by Shire	·· 0.6; tric ph	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were SUZUKI and TAKEDA.	
Nr. 1C Pb(Zr <sub>x</sub> electric	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $Ti_{1-x}$ O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28. Ferro- and antiferroelectevealed in 1952 by Shirthey Phase diagram at high to Phase diagram: Fig. 514	·· 0.6; tric ph kane, S empera	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were SUZUKI and TAKEDA.  ture: Fig. 513.	52S6, 52S4 52S3
Nr. 1C Pb(Zr <sub>x</sub> electric	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $Ti_{1-x}$  O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28. Ferro- and antiferroelectrevealed in 1952 by Shirphase diagram at high to	·· 0.6; tric ph kane, S empera	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were SUZUKI and TAKEDA.  ture: Fig. 513.	52S6, 52S4 52S3
Nr. 1C Pb(Zr <sub>x</sub> electric  1a	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> . Ti <sub>1-x</sub>  O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28. Ferro- and antiferroelectrevealed in 1952 by Shir Phase diagram at high to Phase diagram: Fig. 514 Lattice parameter: Fig. Flux method:  Lattice distortion: Fig. 5 Thermal expansion: Fig.	·· 0.6; tric ph RANE, S empera, 515. 516, 51	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were SUZUKI and TAKEDA.  ture: Fig. 513.  7.  , 519. , 21, 522.	5256, 5254 5253
Nr. 1C Pb(Zr <sub>x</sub> electric  1a   I	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $_{x}$ Ti <sub>1-x</sub> )O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28.  Ferro- and antiferroelectrevealed in 1952 by Shir Phase diagram at high the Phase diagram: Fig. 514 Lattice parameter: Fig. 514 Lattice distortion: Fig. 514 Lattice distortion: Fig. 514 Lattice distortion: Fig. 515 Lattice distortion: Fig. 516 Lattice distortion: Fig. 516 Lattice distortion: Fig. 517 Lattice distortion: Fig. 518 Lattice distortion: Fig. 519 Lattic	·· 0.6; tric ph RANE, S empera , 515. 516, 51 518a, b 520, 5	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were Suzuki and Takeda.  ture: Fig. 513.  7.  , 519. , 21, 522.  • 526.	5256, 5254 5253 6211, 64F6
Nr. 1C Pb( $Zr_x$ electric  1a   I   I   I   I   I   I   I   I   I   I	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $_{x}$ Ti <sub>1-x</sub> )O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28.  Ferro- and antiferroelectrevealed in 1952 by Shirp Phase diagram at high the Phase diagram: Fig. 514 Lattice parameter: Fig. 514 Lattice distortion: Fig. 515 Thermal expansion: Fig. 516 Dielectric constant: Fig. 528.	·· 0.6;  tric ph tane, S empera , 515. 516, 51  520, 5 523 ·· n: Fig.	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were Suzuki and Takeda.  ture: Fig. 513.  7.  , 519. , 21, 522.  • 526.	5256, 5254 5253 6211, 64F6
Nr. 1C Pb(Zr <sub>x</sub> electric  1a	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $_{x}^{2}$ Ti <sub>1-x</sub> )O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28.  Ferro- and antiferroelectrevealed in 1952 by Shir Phase diagram at high to Phase diagram: Fig. 514 Lattice parameter: Fig. 514 Lattice distortion: Fig. 514 Thermal expansion: Fig. 516 Dielectric constant: Fig. 516 Spontaneous polarization	0.6; tric ph RANE, S empera , 515. 516, 51 520, 5 523 n: Fig.	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were Suzuki and Takeda.  ture: Fig. 513.  7.  , 519. , 21, 522.  • 526.	5256, 5254 5253 6211, 64F6
Nr. 1C Pb(Zr <sub>x</sub> electric  1a	$E_{-a27}$ PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $E_{-a27}$ PbTiO <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28. Ferro- and antiferroelectrevealed in 1952 by Shift Phase diagram at high to Phase diagram: Fig. 514 Lattice parameter: Fig. 514 Lattice distortion: Fig. 514 Lattice distortion: Fig. 514 Lattice distortion: Fig. 515 Thermal expansion: Fig. 516 Dielectric constant: Fig. 529 Specific heat: Fig. 529.	0.6; tric ph RANE, S empera, 515. 516, 51 520, 5 523 n: Fig.	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were SUZUKI and TAKEDA.  Ature: Fig. 513.  7.  , 519. , 21, 522.  - 526. 527.	5256, 5254 5253 6211, 64F6
Nr. 1C Pb(Zr <sub>x</sub> electric  1a	C-a27 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> $Ti_{1-x}$ O <sub>3</sub> with $x = 0.5$ c materials, see 1C-a28.  Ferro- and antiferroelectrevealed in 1952 by Shire Phase diagram at high to Phase diagram: Fig. 514 Lattice parameter: Fig. Flux method:  Lattice distortion: Fig. 5Thermal expansion: Fig. Dielectric constant: Fig. Spontaneous polarization Critical field: Fig. 528.  Specific heat: Fig. 529, Transition energy: Tab.	0.6; tric ph RANE, S empera, 515. 516, 51 518a, b 520, 5 523 n: Fig.	for electromechanical properties of these very impasse transitions in the PbTiO <sub>3</sub> -PbZrO <sub>3</sub> system were SUZUKI and TAKEDA.  Ature: Fig. 513.  7.  , 519. , 21, 522.  - 526. 527.	5256, 5254 5253 6211, 64F6

ge at

Tab. 66. Pb(Zr-Ti)O<sub>3</sub>. Transition energy and entropy. [53S1]. x: atomic percent of PbTiO<sub>3</sub>;  $d\Theta/dx$ : shift of the transition temperature with x;  $dS(d\Theta/dx)$ : it may be assumed that the free energy should decrease with the rate of  $dS(d\Theta/dx)$  with increasing x.

Kind of the phase change	°C Θ	$\Delta Q_{\rm m}$ cal mol <sup>-1</sup>	$\Delta S_{\mathbf{m}}$ cal $\mathrm{mol^{-1}} {}^{\circ}\mathrm{K^{-1}}$	d Θ/d x	dS(dΘ/dx)
$\begin{array}{c} A_{\alpha} \rightarrow P_{\alpha} \\ A_{\alpha} \rightarrow A_{\beta} \\ A_{\beta} \rightarrow P_{\alpha} \\ A_{\beta} \rightarrow F_{\alpha} \\ F_{\alpha} \rightarrow P_{\alpha} \\ A_{\beta} \rightarrow F_{\alpha} \end{array}$	230 > T > 225 225 230 240 217	400 110 290 — 250 40	0.8 0.22 0.58 - 0.51 0.08	-16 -4 -19 +1.0	(-5.8) -3.5 -2.3 - +0.5

Tab

Pb(;  $\mathrm{Pb}_{0.}$  $\mathrm{Pb}_{\text{o.}}$  $Pb_0$ .  $Pb_{0}$ .  $\mathrm{Pb}_{0.^{\cdot}}$  $Pb_0$ .  $Pb_0$  $Pb_{0,:}$  $Pb_{0,:}$  $\mathrm{Pb}_{0.1}$  $\mathrm{Pb}_{\mathbf{0.1}}$  $Pb_{0,i}$  $Pb_{0.1}$  $Pb_{0,i}$  $\mathrm{Pb}_{0.8}$  $Pb_{0,t}$  $Pb_{0,t}$  $\mathrm{Pb}_{0.\epsilon}$ Pb<sub>0.8</sub>  $Pb_{0.8}$ 

Tab.

None 0.11 0.51 0.81 1.01 1.21 1.41 1.71 2.01 0.51 1.07 2.07 2.07 2.07 5.07

Nr. 10 For ge	C-a28 P eneral p	b(Zr <sub>x</sub> ) roperti	Γi <sub>1- x</sub> ) ies of	O <sub>s</sub> (a PbT	$x = iO_3$ -	<b>0.5</b> · · · PbZrC	0.6, lea	d ziro C-a27.	onate-	tita	nate)				
1a	JAFFE,	Rотн, Γi)О₃ с	and i	Mar cs in	ZULI 195	o disc 4. P2	overed T is th	the e	xcellen de mar	t p	iezoelecti f this su	ic perfor	mances develope	of 54	1]1
	Dielecti									543	3, 544.				
7)	Electron Fig. 539	mechar	nical 2; Ta	prop b. 73	ertie 3; Fi	es (cer g. 543	amics) 554	Tab	. 67; I	Fig.	534 5	38; Tab.	68 · · · 72	2;	
10	Electric For bre	al cond akdow	luctiv n, see	ity:	see			<del></del>						59	G1, 61S1 G2
	. 67. P	D(11 <sub>1-π</sub>	$(Z\Gamma_x)$	3 [x	= 0	.48	0.60] (	ceram	ics). I	Elec	tromecha	inical cor	istants a	t RT.	[ <i>60B3</i> ]
Zr/Ti atom ratio	k <sub>31</sub>	$k_{p}$	k <sub>15</sub>		t <sub>33</sub>	<b>μ</b> Τ 111	κS	κ <sub>33</sub>	ν <sub>3</sub>	S S	κ <b>S</b> calc				
48/52 50/50 52/48 54/46 56/44 58/42 60/40	0.170 0.230 0.313 0.280 0.267 0.254 0.238	0.289 0.397 0.529 0.470 0.450 0.428 0.400	0.40 0.50 0.69 0.70 0.65 0.64 0.62	1 0. 1 0. 1 0. 7 0. 6 0.	435 546 670 626 619 607 585	663 855 1180 990 840 751 672	551 631 612 504 477 437 410	666 846 730 450 423 397 376	58. 39. 25. 24. 24.	5 9 3 6 3	537 585 389 268 258 246 245		4		
	s <sub>11</sub>	$s_{11}^D$	S.E.		S D 33	S <sup>E</sup> 44	s <sub>44</sub> <sup>D</sup>	S <sub>66</sub>	sf	E 12	s <sub>12</sub> <sup>D</sup>	S <sup>E</sup> <sub>13</sub>	s <sub>13</sub> <sup>D</sup>	Den- sity	<u>.</u>
							10-12	n² N-	1				-	10 <sup>3</sup> kgm <sup>-1</sup>	3
48/52 50/50 52/48 54/46 56/44 58/42 50/40	10.8 12.4 13.8 11.6 11.0 10.5 10.4	10.5 11.7 12.4 10.7 10.2 9.85 9.75	10.9 13.3 17.1 14.8 14.0 12.8 12.0	9 9 9 8 8	.83 .35 .35 .0 .65 .10	28.3 32.8 48.2 45.0 39.8 37.7 36.9	23.6 24.5 25.0 22.9 22.6 21.9 22.5	28.3 32.9 38.4 29.9 28.4 27.1 26.7	$   \begin{vmatrix}     -4 \\     -4 \\     -3 \\     -3 \\     -3   \end{vmatrix} $	.07	-4.72 -5.38 -4.24 -4.01 -3.75	-3.21 -4.22 -5.80 -4.97 -4.63 -4.12 -3.72	-2.40 -2.60 -2.56 -2.68 -2.57 -2.33 -2.17	7.59 7.55 7.55 7.62 7.59 7.64	-
	. E31	g <sub>s</sub>	3	315	g 33	-g <sub>31</sub>	$d_{31}$	$d_{33}$	d <sub>15</sub>	a	$d_{33} - d_{31}$	$\begin{array}{c} s_{33}^D + s_{11}^D \\ -2s_{13}^D \end{array}$			
		10-	-3 m <sup>2</sup>	C-1				10-	-12 C N	-1		10 <sup>-12</sup> m <sup>2</sup> N <sup>-1</sup>			
18/52 50/50 52/48 54/46 66/44 58/42 50/40	- 7.3 - 9.3 14.5 15.1 14.5 13.9 13.3	34 38 37 36	1 3 5 4 1 5 8 4 7 4	8.4 3.2 7.2 0.3 8.0 8.8 9.3	3 4 5 5 5	6.0 2.4 9.0 3.2 2.3 0.6 8.5	43.0 70.0 93.5 60.2 54.3 48.9 44.2	110 173 223 152 142 129 117	166 251 494 440 357 325 293		153 243 316 212 196 178 161	24.1 26.2 26.9 25.1 24.0 22.6 22.0	_		
	Qmech	(=	) <sub>E</sub> = 1/ 1 δ)	10°C m	-2	c <sub>33</sub> <sup>D</sup> 10 <sup>10</sup> Nm <sup>-</sup>		_	$\frac{-s_{12}^D}{s_{11}^D}$		$\frac{-s_{13}^{E}}{\sqrt{s_{33}^{E}s_{11}^{E}}}$	$\frac{-s_{13}^{D}}{\sqrt{s_{33}^{D}s_{11}^{D}}}$			
18/52 50/50 52/48 54/46 56/44 58/42 50/40	1170 950 860 680 490 500	3 3 3 1 2	80 60 60 90 90 10	17 27 36 42 48 43 33	.5	14.0 13.5 13.4 14.8 15.3 15.8 15.6	0.32 0.32 0.29 0.28 0.29 0.29	28   0 95   0 88   0 93   0 92   0	).349 ).404 ).434 ).396 ).394 ).381 ).365		0.296 0.329 0.376 0.380 0.373 0.355 0.332	0.250 0.249 0.238 0.273 0.274 0.261 0.247	_		

Tab. 68.  $(Pb_{1-x}Sr_x)$   $(Zr_{1-y}Ti_y)O_3$  and  $(Pb_{1-x}Ca_x)$   $(Zr_{1-y}Ti_y)O_3$  (modified ceramics). Effects of Ca and Sr on electromechanical properties. [59K4]

-				24	hours a	fter poli	ng		
Intended composition	θa 10 <sup>3</sup> kg m <sup>-3</sup>	x at 1 kHz	x at 1 kHz	tan δ % at 1 kHz	$k_{\mathrm{p}}$	$\begin{vmatrix} d_{31} \\ 10^{-12} \\ \text{C N}^{-1} \end{vmatrix}$	g <sub>31</sub> 10 <sup>-3</sup> m <sup>2</sup> C <sup>-1</sup>	$\begin{array}{c} (s_{11}^{E})^{-1} \\ 10^{10} \\ \text{N m}^{-2} \end{array}$	Θ <sub>f</sub> °C
Pb(Zr <sub>0,53</sub> Ti <sub>0,47</sub> )O <sub>3</sub>	7.40	736	544	0.5	0.48	71	14.7	7.67	385
$Pb(Zr_{0.53}Ti_{0.47})O_3$	7.39	707	542	0.4	0.47	69	14.4	7.76	
$Pb_{0.99}Ca_{0.01}(Zr_{0.53}Ti_{0.47})O_3$	7.42	729	624	0.5	0.49	77	13.9	7.89	
$Pb_{0.99}Sr_{0.01}(Zr_{0.53}Ti_{0.47})O_3$	7.42	755	584	0.6	0.49	75 ·	14.5	7.68	
$Pb_{0.95}Ca_{0.05}(Zr_{0.53}Ti_{0.47})O_3$	7.26	832	973	0.5	0.44	88	10.2	7.62	
$Pb_{0.95}Sr_{0.05}(Zr_{0.53}Ti_{0.47})O_3$	7.47	920	1002	0.4	0.50	101	11.4	7.65	360
$Pb_{0.92} Ca_{0.08} (Zr_{0.53}Ti_{0.47})O_3$	6.86	794	888	0.4	0.32	60	7.6	7.85	
$Pb_{0.925}Sr_{0.075}(Zr_{0.53}Ti_{0.47})O_3$	7.29	942	1094	0.3	0.50	103	10.6	7.94	
$Pb_{0.90}Sr_{0.10}(Zr_{0.53}Ti_{0.47})O_3$	7.22	997	1129	0.3	0.49	103	10.3	7.95	290
$Pb_{0.875}Sr_{0.125}(Zr_{0.47}Ti_{0.53})O_3$	7.09	609	663	0.3	0.28	40	6.8	9.91	
$Pb_{0.875}Sr_{0.125}(Zr_{0.50}Ti_{0.50})O_3$	7.11	813	880	0.3	0.33	57	7.3	9.05	
Pb <sub>0.875</sub> Sr <sub>0.125</sub> (Zr <sub>0.52</sub> Ti <sub>0.48</sub> )O <sub>3</sub>	7.10	973	1149	0.3	0.44	91	9.0	8.32	
$Pb_{0.875}Sr_{0.125}(Zr_{0.53}Ti_{0.47})O_3$	7.14	1076	1237	0.4	0.47	100	9.1	8.06	265
$Pb_{0.875}Sr_{0.125}(Zr_{0.54}Ti_{0.46})O_3$	7.16	1095	1325	0.6	0.51	119	10.1	7.51	
$Pb_{0.875}Sr_{0.125}(Zr_{0.56}Ti_{0.44})O_3$	7.14	1105	1210	0.4	0.51	116	10.8	7.31	
$Pb_{0.875}Sr_{0.125}(Zr_{0.59}Ti_{0.41})O_3$	7.17	919	585	0.4	0.45	66	12.7	8.39	
Pb <sub>0.85</sub> Sr <sub>0.15</sub> (Zr <sub>0.53</sub> Ti <sub>0.47</sub> )O <sub>3</sub>	6.90	1106	1260	0.5	0.43	97	8.7	7.68	242
$Pb_{0.80}Sr_{0.20}(Zr_{0.50}Ti_{0.50})O_3$	6.56	941	970	0.6	0.29	56	6.5	8.11	
$Pb_{0.80}Sr_{0.20}(Zr_{0.53}Ti_{0.47})O_3$	6.48	1212	1257	0.5	0.34	86	7.8	7.05	
$Pb_{0.80}Sr_{0.20}(Zr_{0.54}Ti_{0.46})O_3$	6.36	1182	1341	0.8	0.35	91	7.7	6.18	
$Pb_{0.80}Sr_{0.20}(Zr_{0.55}Ti_{0.45})O_3$	6.36	1200	1337	0.8	0.34	86	7.3	6.42	
$Pb_{0.80}Sr_{0.20}(Zr_{0.56}Ti_{0.44})O_3$	6.35	1107	1113	0.7	0.35	81	8.2	6.50	l

*B3*]

Tab. 69.  $Pb(Zr-Ti)O_3$  (ceramics, modified). Electromechanical properties of  $Pb(Zr_{0.54}Ti_{0.46})O_3$  with five-valent additives. [59K5].  $f_R \cdot r$ : radial frequency constant

		Before	poling		24	hours a	after poli	ng		
Addition wt. %	$\frac{\varrho_a}{10^3}$ kg m <sup>-3</sup>	x at 1 kHz	tan δ % at 1 kHz	at 1 kHz	tan δ % at 1 kHz	k <sub>p</sub>	$f_{\mathbf{R}} \cdot \mathbf{r}$ $\mathbf{Hz} \cdot \mathbf{m}$	$\begin{array}{c c} d_{31} \\ 10^{-12} \\ \text{CN}^{-1} \end{array}$	$Q_{ m mech}$	<b>Θ</b> t °C
None None 0.1 Nb <sub>2</sub> O <sub>5</sub> 0.5 Nb <sub>2</sub> O <sub>5</sub>	7.41 7.29 7.26 6.96	707 706 598 732	0.3 0.4 0.3 2.1	537 513 508 790	0.4 0.5 0.4 2.0	0.49 0.50 0.38 0.46	1641 1687 1643 1443	71 69 54 94		390 387
0.8 Nb <sub>2</sub> O <sub>5</sub> 1.0 Nb <sub>2</sub> O <sub>5</sub> 1.0 Nb <sub>2</sub> O <sub>5</sub> 1.2 Nb <sub>2</sub> O <sub>5</sub> 1.4 Nb <sub>2</sub> O <sub>5</sub> 1.7 Nb <sub>2</sub> O <sub>5</sub>	7.36 7.36 7.60 7.34 7.37 7.39	965 1064 1055 1011 1057 1058	1.6 1.8 2.2 2.0 2.2 2.0	1166 1308 1242 1167 1218 1218	1.5 1.6 2.2 1.7 1.9	0.48 0.53 0.54 0.48 0.50 0.47	1606 1563 1538 1614 1584 1594 1550	105 126 125 104 113 105 115	61 70 69	361 344
2.0 Nb <sub>2</sub> O <sub>5</sub> 0.5 Nb <sub>2</sub> O <sub>5</sub>	7.37	1074 1169	2.1	1202 1377	2.0	0.50 0.57	1491	146	48	369
$\begin{array}{c} 0.5 \text{ La}_{2}^{2}O_{3}^{2} \\ 1.0 \text{ Ta}_{2}O_{5} \\ 1.0 \text{ Ta}_{2}O_{5} \\ 2.0 \text{ Ta}_{2}O_{5} \end{array}$	7.31 7.22 7.49	989 918 1062	1.5 2.0 2.2	1187 1121 1230	1.5 2.1 2.1	0.49 0.50 0.50	1563 1525 1547	111 114 115	61	368
2.0 Ta <sub>2</sub> O <sub>5</sub> 2.5 Ta <sub>2</sub> O <sub>5</sub> 5.0 Ta <sub>2</sub> O <sub>5</sub>	7.40 7.23 6.75	1077 959 995	1.8 2.7 2.5	1275 1112 1052	1.8 2.4 2.6	0.48 0.36 0.33	1581 1518 1508	111 82 76	28	364

Tab. 70. Pb(Zr-Ti)O<sub>3</sub> (ceramics, modified). Electromechanical properties of Pb(Zr<sub>0.54</sub>Ti<sub>0.46</sub>)O<sub>3</sub> with three-valent additives. [59K5].  $f_{\mathbb{R}} \cdot r$ : radial frequency constant

		Refore	nolina	1					
Addition	$\varrho_{\mathbf{a}}$	Delote	poling		24 h	ours afte	er poling		
wt. %	10 <sup>3</sup> kg m <sup>-3</sup>	at 1 kHz	tan δ % at 1 kHz	at 1 kHz	tan δ % at 1 kHz	$k_{\mathbf{p}}$	f <sub>R</sub> ·r Hz·m	$\begin{array}{ c c c } d_{31} \\ 10^{-12} \\ \text{C N}^{-1} \end{array}$	% <b>6'</b>
None None $1.0  ext{ Y}_2 ext{O}_3$ $1.0  ext{ La}_2 ext{O}_3$ $1.0  ext{ Md}_2 ext{O}_3$ $1.0  ext{ Nd}_2 ext{O}_3$ $1.0  ext{ Md}_2 ext{O}_3$ $1.0  ext{ La}_2 ext{O}_3$ $1.0  ext{ La}_2 ext{O}_3$ $0.1  ext{ La}_2 ext{O}_3$ $0.2  ext{ La}_2 ext{O}_3$ $0.4  ext{ La}_2 ext{O}_3$ $0.8  ext{ La}_2 ext{O}_3$ $1.0  ext{ La}_2 ext{O}_3$	7.41 7.29 7.26 7.46 7.47 7.43 7.37 7.41 7.49 7.20 7.35 6.45 6.45 6.44 7.19 7.50	707 706 796 1187 1139 1111 1101 1122 1296 1375 1362 790 686 942 1288 1255	0.3 0.4 0.9 1.9 2.2 1.6 1.9 2.2 2.6 2.1 2.2 0.4 0.7 1.4 1.8 2.4	537 513 841 1483 1387 1395 1354 1341 1545 1792 1776 870 735 1100 1682 1532	0.4 0.5 1.0 2.0 2.1 1.8 1.8 2.2 2.3 1.7 1.9 0.6 0.9 1.5 1.8 2.4	0.49 0.50 0.34 0.53 0.52 0.49 0.48 0.50 0.51 0.49 0.42 0.37 0.42 0.49 0.50	1641 1687 1547 1510 1522 1512 1511 1499 1545 1528 1558 1505 1419 1407 1516 1550	71 69 66 138 130 123 119 125 132 147 136 88 78 109 139 128	390 387 374 339 348

Tab. 71. Electromechanical properties of  $Pb(Zr_{1-x}Ti_x)O_3$  (ceramics), modified with additives of 1 wt% Nb. [59K5].  $f_{\mathbb{R}} \cdot r$ : radial frequency constant

	Q <sub>a</sub>	Before	poling	24 hours after poling						
Base composition	10 <sup>3</sup> kg m <sup>-3</sup>	at 1 kHz	tan δ % at 1 kHz	at 1 kHz	tan δ % at 1 kHz	$k_{p}$	$f_{\mathbf{R}} \cdot \mathbf{r}$ $\mathbf{H} \mathbf{z} \cdot \mathbf{m}$	$\begin{array}{ c c c }\hline d_{31} \\ 10^{-12} \\ \text{CN}^{-1} \\ \end{array}$	$Q_{ m mech}$	
$\mathrm{Pb}(\mathrm{Zr_{0.50}Ti_{0.50}})\mathrm{O_3}$	7.38	879	1.5	1041	1.2	0.42	1696	82	l 04	
$\mathrm{Pb}(\mathrm{Zr}_{0.51}\mathrm{Ti}_{0.49})\mathrm{O}_{3}$	7.31	975	1.6	1188	1.3	0.42	1642		81	
$\mathrm{Pb}(\mathrm{Zr_{0.52}Ti_{0.48}})\mathrm{O_3}$	7.39	985	1.5	1200	1.4	0.45	1640	97	73	
$Pb(Zr_{0.53}Ti_{0.47})O_3$	7.43	1092	1.8	1371	1.4	0.43		97	76	
$Pb(Zr_{0.54}Ti_{0.46})O_3$	7.44	1051	1.8	1296	1.7		1547	130	61	
$Pb(Zr_{0.55}Ti_{0.45})O_3$	7.40	955	2.4	973		0.54	1549	128	62	
$Pb(Zr_{0.56}Ti_{0.44})O_3$	7.38	818			2.0	0.56	1524	117	55	
$Pb(Zr_{0.57}Ti_{0.43})O_3$	7.41	1 1	2.8	745	2.5	0.53	1601	93	56	
$Pb(Zr_{0.58}Ti_{0.42})O_3$		750	3.0	684	2.5	0.50	1636	82	60	
$10(21_{0.58}11_{0.42})O_3$	7.41	713	3.0	630	2.8	0.49	1676	75	62	

Tab. 72. Electromechanical properties of  $(Pb_{0.95}Sr_{0.05})$   $(Zr_{0.54}Ti_{0.46})O_3$  (ceramics) with  $Nb_2O_5$  or  $Ta_2O_5$ . [59K5].  $f_R \cdot r$ : radial frequency constant

Addition	$\varrho_{\mathbf{a}}$	Before poling		24 hours after poling					
wt. %	10 <sup>3</sup> kg m <sup>-3</sup>	at 1 kHz	tan δ % at 1 kHz	at 1 kHz	tan δ % at 1 kHz	$k_{ \mathbf{p}}$	f <sub>R</sub> · r Hz · m	$d_{31} \\ 10^{-12} \\ \text{CN}^{-1}$	°C °C
1.0 Nb <sub>2</sub> O <sub>5</sub> 2.0 Nb <sub>2</sub> O <sub>5</sub> 3.0 Nb <sub>2</sub> O <sub>5</sub> 2.0 Ta <sub>2</sub> O <sub>5</sub>	7.34 7.22 6.63 7.33	1291 1380 1125 1343	2.0 2.4 2.1 2.3	1609 1662 1301 1695	2.0 2.1 2.1 2.0	0.56 0.47 0.36 0.54	1512 1562 1550 1517	153 127 91 151	306 296

	h <sub>15</sub>	108 N C-1	21.9 19.7 15.2 11.3	12.2 23.4	$s_{13}^D$		2.68 2.10 2.98 3.05	_2.6 _2.3	668		33.4 30.6 22.6 23.5	41.7	
	gas	1	38.1 26.1 24.8 19.7	17.3 40.7 24.5	5.13		-4.97 -5.31 -7.22 -8.45	_3.1 4.6	C44		43.7 51.8 39.7 42.2	41.3	
	£31	0-3 m <sup>2</sup> C-	-15.1 -11.1 -11.4 - 9.11	- 6.6 -16.2 -10.5	$s_{12}^{D}$		-4.24 -5.42 -7.71	- 3.2 - 4.2 - 4.2	C44		22.2 25.6 21.1 23.0	35.4	
[6661]	815	1	50.3 39.4 38.2 26.8	29.6 49.5	S 12	12 N-1	-3.33 -4.05 -5.74 -4.78	3.0	$c_{13}^D$		61.2 60.9 65.2 72.2	82.4 73.0	
es at RT.	633		9.0 15.1 15.8 23.3	7.4	S. 23.3	10-12 m	9.0 7.90 9.46 8.99	8.05 7.65 8.9	$c_{13}^E$		68.1 74.3 75.2 84.1	84.0	
al constant	631	C m-2	-1.86 -5.2 -5.4 -6.55	_0.96 _2.15	5.83		14.8 15.5 18.8 20.7	9.35 13.9 13.9	$c_{12}^D$	10° N m <sup>-2</sup>	69.3 83.9 80.9 82.8	86.2 85.4	
Electromechanical constants at	e <sub>15</sub>		9.8 12.7 12.3 17.0	9.3	s <sub>11</sub>		10.7 10.9 14.4 14.05	8.8 9.7 10.1	$c_{12}^{E}$		67.9 77.8 79.5 79.5	85.1 76.2	
i	d <sub>33</sub>	1	152 289 374 593	76 153 215	$S_{11}^{E}$		11.6 12.3 16.4 16.5	9.0 10.7 11.1	$c_{33}^D$		148 159 147 157	177	·
ommercial modified ceramics).	$d_{31}$	0-12 C N-1	- 60.2 -123 -171 -274		ч	γ.	0.47 0.58 0.60 0.65	101mm	C 33		113	163	
al modifie	d <sub>15</sub>	1	440 496 584 741	135 368		χ ε ε	0.626 0.70 0.705 0.752	0.375 0.67 0.60	$c_{11}^{D}$		136 145 126 130	169	
(commerci	S	733	260 635 830 1470	420 235		R31 .	0.28 0.334 0.348 0.388	0.145 0.306 0.295	$c_{11}^E$		135 139 121 126	168	
73. PZT	r,	733	450 1300 1700 3400	500 500 1000		R <sub>15</sub>	0.701 0.71 0.685 0.675	0.377	8,66	1	29.9 32.7 44.3 90.0	24.0 27.8 29.6	·
Tab.	S	, 11	504 730 916 1700	441 450	h33	ပ	39.2 26.8 21.5 18.0	19.9 46.6	S.P.	0-12 m² N-	22.9 19.3 25.2 23.7	24.2	
	۲,	II X	990 1475 1730 3130	515 840	h31	10 <sup>8</sup> N	8.1 - 9.2 - 7.3 - 5.05	- 2.6 10.4	S 44	10	45.0 39.0 47.5 43.5	28.2 39.5	
The state of the s	O. h. de	Substance	PZT-2 PZT-4 PZT-5A PZT-5H	PZI-6A PZT-6B PZT-7A PZT-8			PZT-2 PZT-4 PZT-5A PZT-5H	PZI-6A PZT-6B PZI-7A PZT-8			PZT-2 PZT-4 PZT-5A PZT-5H	PZT-6B PZT-7A PZT-7A PZT-8	

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r Ta<sub>2</sub>O<sub>5</sub>.

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Figuren	S.	31	6	ff
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#### II 1 Oxide des Perowskit-Typs

Nr. 1C-a29 PbTiO <sub>3</sub> -PbHfO <sub>3</sub>	1b   Phase diagram: Fig. 555, 556
Nr. 1C-a30 PbTiO <sub>3</sub> -PbO:SnO <sub>2</sub>	_1b   Phase diagram: Fig. 557.
	5a Dielectric constant: Fig. 558.
Nr. 1C-a31 PbZrO <sub>3</sub> -PbHfO <sub>3</sub>	1b   Phase diagram: Fig. 559.
Nr. 1C-a32 PbZrO <sub>3</sub> -PbO:SnO <sub>2</sub>	1b Phase diagram: Fig. 560.  Lattice parameter: Fig. 561.
	4 Thermal expansion: Fig. 562, 563.
	5a Dielectric constant: Fig. 564a, b.
Nr. 1C-a33 LaFeO <sub>3</sub> -BiFeO <sub>3</sub>	1b Phase diagram: Fig. 565. Lattice parameter: Fig. 566a, b.
	5a Dielectric constant: Fig. 567.
	11 Magnetization: see Fig. 565.
Nr. 1C-b1 NaNbO <sub>3</sub> -KTaO <sub>3</sub>	1b   Phase diagram: Fig. 568. Lattice parameter: Fig. 569.
	4 Thermal expansion: Fig. 570.
	5a Dielectric constant: Fig. 571.
Nr. 1C-b2 NaNbO <sub>3</sub> -KSbO <sub>3</sub>	1a   Curie temperature: see Fig. 423.
Nr. 1C-b3 BaTiO <sub>3</sub> -PbZrO <sub>3</sub>	4 Thermal expansion: Fig. 572.
	5a Dielectric constant: Fig. 573.
Nr. 1C-b4 BaTiO <sub>3</sub> -PbO: SnO <sub>2</sub>	1b Phase diagram: Fig. 574. 5a Dielectric constant: Fig. 575.
Nr. 1C-b5 PbTiO <sub>3</sub> -CaZrO <sub>3</sub>	1b   Phase diagram: Fig. 576. Lattice parameter: Fig. 577.  5a   Dielectric constant: Fig. 578
	5a   Dielectric constant: Fig. 578.
Nr. 1C-b6 PbTiO <sub>3</sub> -CaSnO <sub>3</sub>	1b Phase diagram: see Fig. 576. Lattice parameter: Fig. 579.
	5a   Dielectric constant: Fig. 580.
Nr. 1C-b7 PbTiO <sub>3</sub> -SrZrO <sub>3</sub>	1b   Phase diagram: Fig. 581. Lattice parameter: Fig. 582a, b.
	5a Dielectric constant: Fig. 583.
Nr. 1C-b8 PbTiO <sub>3</sub> -SrSnO <sub>3</sub>	1b   Phase diagram: Fig. 584. Lattice parameter: Fig. 585a, b.
	5a Dielectric constant: Fig. 586.
Nr. 1C-b9 PbTiO <sub>3</sub> -BaZrO <sub>3</sub>	1b Phase diagram: Fig. 587. Lattice parameter: Fig. 588a, b.
	5a Dielectric constant: Fig. 589.
	7a   Electromechanical property: Tab. 74.
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	Tab. 74. (1 – 2	*)PbTi(	$O_3 - x Ba Zr O_3$	(ceram	ics). $k_p$ and $d_{33}$ at RT. [6	[3B15]
		x	Poling field · 10 <sup>5</sup> V m <sup>-1</sup> [T in °C]	k <sub>p</sub>	d <sub>33</sub> · 10 <sup>-12</sup> C N <sup>-1</sup>	
		0.25	29 [185 ··· 40]	0.16	40	
		0.30	27 [170 ··· 40]	0.23	50	
		0.35	39 [145 ··· 40]	0.30	110	
		0.40	30 [120 ··· 40]	0.17	45	
	Nr. 1C-b10 PbTiO <sub>3</sub> -BaSnO <sub>3</sub>	1b	Phase diagr Lattice para	am: Fi	g. 590. Fig. 591a, b.	
	Nr. 1C-b11 LaAlO <sub>3</sub> -BiFeO <sub>3</sub>	1b	Phase diagr Lattice para	am : Fig	g. 592. Fig. 593	
		5a	Dielectric co			
	Nr. 1C-b12 LaCrO <sub>3</sub> -BiFeO <sub>3</sub>	1b	Phase diagra	am: Fig	g. 595.	
		4	Thermal exp		Fig. 596a, b. : Fig. 597.	<del></del>
		11			etization: see Fig. 595.	
,	Nr. 1C-c1 NaNbO <sub>3</sub> -CaTiO <sub>3</sub>	1b 5a	Phase diagra			
1	Nr. 1C-c2 NaNbO <sub>3</sub> -BaTiO <sub>3</sub>	1b	Phase diagra			
1	Nr. 1C-c3 NaNbO <sub>3</sub> -PbTiO <sub>3</sub>	1b   5a	Transition te			
1	Nr. 1C-c4 NaNbO3-PbZrO3	1b   5a	Phase diagram			
N	Nr. 1C-c5 KNbO <sub>3</sub> -BaTiO <sub>3</sub>	1b	Phase diagram Lattice param	ieter: F	ig. 606.	·
		5a	Dielectric con	stant: ]	Fig. 607a, b, c.	
N	Ir. 1C-c6 KNbO <sub>3</sub> -PbTiO <sub>3</sub>	1b	Phase diagran Lattice param	ı: Fig. eter: F	608. ig. 609.	
		5a	Dielectric cons	stant: I	Fig. 610a, b.	
N	Ir. 1C-c7 SrTiO <sub>3</sub> -BiFeO <sub>3</sub>	1b	Phase diagram Lattice param	ı: Fig. ( eter: Fi	511. ig. 612.	
					a are observed in the rang	ge II [65F1].
N	r. 1C-c8 BaTiO <sub>3</sub> -LaAlO <sub>3</sub>	1b   1	Lattice parame	eter and	l Curie temperature: Tab.	75.
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	Tab. 75	. BaTiO	3-LaAlO3.	Lattice	parameter	s and $\Theta_{\mathbf{f}}$ .	[5814]	
	Concen mo BaTiO <sub>3</sub>	tration 1% LaAlO <sub>3</sub>	a Å	c Å	c/a	<i>V</i> Åз	Θ <sub>f</sub> °C	
	100.0 99.0 97.5 95.0 92.5 90.0 87.5 85.0 75.0	1.0 2.5 5.0 7.5 10.0 12.5 15.0 25.0 100.0	3.9956 3.9951 3.9949 4.0050 4.0011 3.9984 3.9950 3.9906 3.9800 3.7950	4.0352 4.0345 4.0293 ————————————————————————————————————	1.0100 1.0098 1.0086 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	64.42 64.39 64.30 64.24 64.05 63.92 63.76 63.55 63.04 54.65	+120 + 87 + 46 - 14 - 85 -133 	
Nr. 1C-c9 BaTiO	<sub>3</sub> -BiFeO <sub>3</sub>		11,   1 12   F	Néel tempe Fig. 613.	erature and	l magnetic	resonanc	ce line width:
Nr. 1C-c10 PbTi(	O <sub>3</sub> -LaAlO <sub>3</sub>	:	I	attice par	ram: Fig. ameter: F	ig. 615.		
Nr. 1C-c11 PbTiC	) <sub>3</sub> -LaMnO	3	1b   T	ransition attice par	temperatu ameters: F	res: Fig. 6 ig. 618.	17.	
Nr. 1C-c12 PbTiC	)3-LaFeO3		L	attice par	am: Fig. ( ameter: Fi onstant: F	g. 620.		
Nr. 1C-c13 PbTiO	<sub>3</sub> -BiFeO <sub>3</sub>		1b   P   L   T	hase diagr attice para hermal ex	am: Fig. 6 ameter: Fi pansion: F	522a, b. g. 623a, b. ig. 624.		
Nr. 1C-c14 PbZrO	<sub>'3</sub> -BiFeO <sub>3</sub>		1b P	hase diagr attice para	onstant: F am: Fig. 6 ameter: Fi onstant: F	26. g. 627.		
Nr. 1C-c15 SrSnO <sub>3</sub>	-BiFeO <sub>3</sub>		1b   P	hase diagr	am: Fig. 6	29.		
Nr. 1C-c16 SrFeO <sub>3</sub>	-BiFeO <sub>3</sub>				lume: Fig.			
Nr. 1C-d1 SrTiO <sub>3</sub> -	Sr(Fe <sub>1/2</sub> Ta	<sub>1/2</sub> )O <sub>3</sub>	1b   Pi	nase diagra	am: Fig. 6	33.		
Nr. 1C-d2 BaTiO <sub>3</sub> -	·Ba(Fe <sub>1/2</sub> T	a <sub>1/2</sub> )O <sub>3</sub>	2b   Pi	ase diagra	ım: Fig. 6	34.		
Nr. 1C-d3 BaTiO <sub>3</sub> -	(K <sub>1/2</sub> Bi <sub>1/2</sub> )	TiO <sub>3</sub>	1b   Cu   La	rie tempe ttice para	rature: Fig meters: Fi	g. 635. g. 636.		
Nr. 1C-d4 PbTiO <sub>3</sub> -	·(Na <sub>1/2</sub> Bi <sub>1/</sub>	<sub>2</sub> )TiO <sub>3</sub>			ım and lat nstant: Fi		neters: Fi	g. 637.
Nr. 1C-d5 PbTiO <sub>3</sub> -	(K <sub>1/2</sub> Bi <sub>1/2</sub> )	TiO <sub>3</sub>	1b   Cu	rie temper	ature and	lattice pa	rameters:	Fig. 639.
Nr. 1C-d6 PbTiO <sub>3</sub> -	(Li <sub>1/2</sub> La <sub>1/2</sub>	)TiO <sub>3</sub>	1b   Cu	rie temper	ature and	lattice pa	rameters :	Fig. 640.
<del></del>			T11	a/Nomue		<del></del>		

1b   Curie temperature and lattice parameters: Fig. 641.
1b   Lattice parameters: Fig. 642.
1b   Lattice parameters: Fig. 643.
1b   Phase diagram: Fig. 644. Lattice parameters: Fig. 645.
1b   Curie temperature: Fig. 646.
1b   Curie temperature: Fig. 647.
1b   Transition temperature: Fig. 648.   Lattice parameters: Fig. 649.
1b   Curie temperature: see Fig. 647.
1b   Curie temperature: Fig. 650.
1b   Phase diagram: Fig. 651.
4 Lattice distortion: Fig. 652.
5a Dielectric constant: Fig. 653.
Phase diagram: Fig. 654. Lattice parameters: Tab. 76.
4 Lattice distortion: Fig. 655.
5a Dielectric constants: Fig. 656.

Tab. 76. (1-x)PbZrO<sub>3</sub>  $-x(K_{1/2}Bi_{1/2})$ ZrO<sub>3</sub>. Lattice constants at RT [62B10]

x	a À	b Å	c Å	
0 0.10 0.20 0.30 0.40 0.50	5.884 5.882 5.877 5.876 4.151 4.152	11.768 11.764 11.755 11.751	8.220 8.227 8.237 8.248	orthorhombic orthorhombic orthorhombic orthorhombic cubic cubic

Nr. 1C-d18 PbHfO<sub>3</sub>-Pb(Sc<sub>1/2</sub>Nb<sub>1/2</sub>)O<sub>3</sub>

1b | Curie temperature: see Fig. 647.

Nr. 1C-d19 Pb $(Mg_{1/2}W_{1/2})O_3$ -Pb $(Mg_{1/3}Nb_{2/3})O_3$ 

1b | Phase diagram: Fig. 657.

Nr. 1C-d20  $(Na_{1/2}Bi_{1/2})TiO_3-(K_{1/2}Bi_{1/2})TiO_3$ 

Curie temperature: see Fig. 635. Lattice parameters: see Fig. 636.

Nr. 1C-d21 PbZrO<sub>3</sub>-(Na<sub>1/2</sub>Bi<sub>1/2</sub>)TiO<sub>3</sub>

Phase diagram: Fig. 658. Lattice parameters: Fig. 659. 1b

Nr. 1C-d22 BiFeO<sub>3</sub>-Sr(Sn<sub>1/3</sub>Mn<sub>2/3</sub>)O<sub>3</sub>

Phase diagram: Fig. 660. Lattice parameters: Fig. 661. 1b|

12c | Mössbauer effect: see [65M8]

Nr. 1C-d23 BiFeO<sub>3</sub>-Pb(Fe<sub>1/2</sub>Nb<sub>1/2</sub>)O<sub>3</sub>

1b Lattice parameters: Fig. 662. Dielectric constant: Fig. 663.

11 Magnetic susceptibility: Fig. 664. Néel temperature and spontaneous magnetization:

Fig. 665.

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Nr. 1C-e1 N	aNbO3-LiNbO3	1b 5a		se diagra ectric co		g. 666. Fig. 667			
Nr. 1C-e2 N	aNbO3-NaVO3		_ 5a	Diel	ectric co	nstant:	Fig. 668		
			14b	Swit	ching: se	ee Fig.	9.		
Nr. 1C-e3 N	aNbO3-CaNb2O6		1b	Phas	se diagra	m: Fig	. 669.		
			5a	Diele	ectric cor	nstant:	Fig. 670.		
Nr. 1C-e4 Na	NbO3-CdNb2O6		1b	Phas Latt	e diagran	m: Fig neter:	. 671, 672 Fig. 673.	2	
			5a				Fig. 674;	Tab.	77.
		-	7a	Piezo	electrici	ty: Fig	. 675; Ta	b. 78.	
Tab. 77. (1 -	-x)NaNbO <sub>3</sub> $-(x/2)$ 0	CdNb <sub>2</sub> O <sub>6</sub> [56 par	5L2]. r: e Fig. 67	capaci 1, 672	tance rat	tio; C:	Curie cor	nstant;	$\Theta_{\mathbf{f}}$ , $\Theta$ com-
Compo- sition	Firing conditions	I	r	<i>Θ</i> ℃	×max	Θ <sub>f</sub> °C	С	$\Theta_{p}$	ę
x	T   $t$   atm	08-   101		l C	max	l °C	· 10⁴ °C	°C	103 kg m-8

For

Nr.

Compo-	Firin	g cond	litions								
sition x	°C	<i>t</i> hr	atmos- phere	× <sub>RT</sub>	r	°C	×max	Θ <sub>r</sub> °C	<i>C</i> · 10⁴ °C	°C	0 103 kg m−3
0.02 0.05 0.10 0.15 0.20 0.25 0.30	1250 1250 1250 1250 1250 1250 1250 1220	1 1 1 1 1 1 2	CdO CdO CdO CdO CdO CdO CdO	230 500 1000 1400 2300 3500 2700	1200 130 40 20 10 12	200 60 75 50 20 5 -25	2700 4000 4100 8500 10000 15000 11000	375 375 320 285 250 220 210	12 12 18 24 14 20 20	345 345 275 260 250 230 205	3.9 4.2 4.3 4.3 4.4 4.5

Tab. 78. (1-x)NaNbO<sub>3</sub> -(x/2)CdNb<sub>2</sub>O<sub>6</sub> (ceramics) [62K4]

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x	0.05	0.10	0.15	0.20	0.25	0.30	
<u>e</u>	4.2	4.3	4.3	4.3	4.4	4.2	10 <sup>3</sup> kg m <sup>-3</sup>
$f_{\mathbf{R}} \cdot 2r$	3.0	3.0	3.0	3.15	3.36	3.25	103 Hz m
s <u>E</u>	11.9	11.6	11.6	10.5	9.0	10.1	10 <sup>-12</sup> m <sup>2</sup> N <sup>-1</sup>
tan δ	0.01	0.01	0.02	0.01	0.01	0.03	
× at Θ <sub>f</sub>	4	4.1	8.5	16	13	11	10³

Nr. IC-e5 NaNbO <sub>3</sub> -SrNb <sub>2</sub> O <sub>6</sub>	1b Phase diagram: Fig. 676. Lattice parameter: Fig. 677.
	5a Dielectric constant: Fig. 678.
	7a   Electromechanical properties: Fig. 679, 680, 681.
Nr. 1C-e6 NaNbO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>	1b   Phase diagram: Fig. 682. Lattice parameter: Fig. 683.
	7a   Electromechanical properties: Fig. 684.
Nr. 1C-e7 CdTiO <sub>3</sub> -LiNbO <sub>3</sub> , CdTiO <sub>3</sub> -LiTaO <sub>3</sub>	5a   Dielectric constant: Fig. 685.
Nr. 1C-e8 SrTiO <sub>3</sub> -Bi <sub>2</sub> O <sub>3</sub> · 3TiO <sub>2</sub>	1b Lattice parameter: Fig. 686.
	5a   Dielectric constant: Fig. 687, 688.
Nr. 1C-e9 BaTiO <sub>3</sub> -BaNb <sub>2</sub> O <sub>6</sub>	1b   Phase diagram: Fig. 689.

Nr. 1C-e10 BaTiO <sub>3</sub> -BaTa <sub>2</sub> O <sub>6</sub>	1b   Lattice parameter: Fig. 690.	
	5a Dielectric constant: Fig. 691.	$\neg$
Nr. 1C-e11 BaTiO <sub>3</sub> -A <sub>2</sub> B <sub>2</sub> O <sub>7</sub>	1b   Curie temperature: Fig. 692.	_
	5a   Dielectric constant: Fig. 693 ··· 697.	ļ
		1
Nr. 1C-e12 PbZrO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>	4 : 1 5D 0	
For the solid solution with PbNb <sub>2</sub> O <sub>6</sub> as an end r		
	1b Phase diagram: Fig. 698.  4 Thermal expansion: Fig. 699.	$\dashv$
	5 Dielectric constant: Fig. 700.	
	J   Diciocute constant. Fig. 700.	
Nr. 1C-e13 PbZrO <sub>3</sub> -PbTa <sub>2</sub> O <sub>6</sub>	1b   Phase diagram: Fig. 701.	
141. 10-013 1 52103-1 5 1 5 2 6	4 Thermal expansion: see Fig. 699.	
	5 Dielectric constant: Fig. 702.	
	, c	
Nr. 1C-f1 CaTiO <sub>3</sub> -SrTiO <sub>3</sub> -BaTiO <sub>3</sub>	1b   Phase diagram: Fig. 703.	
Nr. 1C-f2 CaTiO <sub>3</sub> -BaTiO <sub>3</sub> -PbTiO <sub>3</sub>	1b   Phase diagram: Fig. 704, 705.	
	Curie temperature: Fig. 706.	_
	7a   Electromechanical properties: see Nr. 1A-8, 7a	٠
	41 1 Di France E'- 707	
Nr. 1C-f3 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> -PbO:SnO <sub>2</sub>	1b Phase diagram: Fig. 707.	
	8b   Elastic properties: Fig. 708, 709.	Ì
Nr. 1C-i4 PbTiO <sub>3</sub> -PbHiO <sub>3</sub> -PbO:SnO <sub>2</sub>	1b   Phase diagram: Fig. 710.	
Nr. 1C-14 FB1103-1 b0.51102	10   1111100 diagram: 115. 1101	
Nr. 1C-f5 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> -LaFeO <sub>3</sub>	1b   Phase diagram: Fig. 711.	:
141. 16-15 151103-152103 200-5	Lattice parameters: Fig. 712.	
Nr. 1C-f6 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> -BiFeO <sub>3</sub>	1b   Phase diagram: Fig. 713.   Lattice parameters: Fig. 714.	
	Datelee parameters, 148, 711.	
Nr. 1C-f7 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> -Pb(Mg <sub>1/3</sub> Nb <sub>2/3</sub> )O <sub>3</sub>	1b   Phase diagram: Fig. 715.	
141. 16-1. 161163 182163 18(1-161/3-1-2/3/-3	Lattice parameters: Fig. 716.	_
	7a   Electromechanical property: Fig. 717, 718.	
Nr. 1C-i8 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> -Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1b   Lattice parameters: Fig. 719.   Curie temperature: Fig. 720.	
	7a Electromechanical property: Fig. 721.	
	in   Book oncome property and	
Nr. 1C-f9 PbTiO <sub>3</sub> -PbZrO <sub>3</sub> -ABO <sub>3</sub>	1b   Phase diagram: Fig. 722.	
14. 10-17 101103-102103-11203		
No 1C 410 PLTIO Sertio LaMaO	1b   Curie temperature: Fig. 723.	
Nr. 1C-f10 PbTiO <sub>3</sub> -SrTiO <sub>3</sub> -LaMnO <sub>3</sub>	To   Outro componenter x 18. (20).	
No 10 M4 Physic A 34 C A 34-C (M-	in Co Ni Cr)	
Nr. 1C-f11 PbTiO <sub>3</sub> -LaMnO <sub>3</sub> -LaMeO <sub>3</sub> (Me = F		
	1b Transition temperatures: Fig. 724.  5a Dielectric constant: Fig. 725.	
<u>.</u>	11 Magnetic susceptibility: see Fig. 725.	
	Magnetization: Fig. 726.	
巅		

6a 9a

10

12c 14a

17

Tab.

W

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3 L 3A : Nr. :

Nr. 1C-f12 BaTiO <sub>3</sub> -SrTiO <sub>3</sub> -LaYO <sub>3</sub> -LaInO <sub>3</sub>	1h I	Dhan 1			
Nr. 1C-f13 CaSnO <sub>3</sub> -SrSnO <sub>3</sub> -BaSnO <sub>3</sub>	1b	4.48			
Nr. 1C-f14 (Na-K)(Nb-Ta)O <sub>3</sub>	1b	Phase diag			
Nr. 1C-f15 (Ca-Ba)(Ti-Zr)O <sub>3</sub>		Phase diagr			
	1Ь	Phase diagr	am: Fig.	730.	
Nr. 1C-f16 (Sr-Pb)(Ti-Zr)O <sub>3</sub>	1	Phase diagr Lattice para Transition t	ımeter: Fi	or 732	722
N. 40 MD	5a	Dielectric co	nstant: F	ig. 734,	735.
Nr. 1C-f17 (Ba-Pb)(Ti-Zr)O <sub>3</sub>	1b   3	Phase diagra Lattice para	ım: Fig. 7 meter: Fi	36. - 737	
•	7a ]	Transition to	emperatur	e: Fig. 7	38.
Nr. 1C-f18 (Ba-Pb)(Ti-Sn)O <sub>3</sub>	1b   I	Phase diagra Lattice para	m: Fig. 7	11, 742.	Fig. 739, 740.
Nr 1C 410 B-T-10 B-T-10	, ,	ransition te	mperature	: Fig. 74	14.
Nr. 1C-f19 BaTiO <sub>3</sub> -PbTiO <sub>3</sub> -BaNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	6 1b   P	hase diagra	m: Fig. 74	.5	
	L	attice parar	neter: Fig	. 746.	
2 WO <sub>3</sub>					
A Pure compound					
Nr. 2A-1 WO <sub>3</sub> , Tungsten trioxide					
··· · W.U. Lungsten triovida					
a The anomalous dielectric and the	ramic spec	imens of W	O. were d	liscovor	a l
The anomalous dielectric properties of cer by Ogawa <sup>a</sup> ) in 1948. Possibility of ferro Matthias <sup>b</sup> ) in 1949.	ramic spec oelectricity	imens of W	O <sub>3</sub> were d	liscovere d out b	d   y   <sup>a</sup> )48N1,48N
The anomalous dielectric properties of cerby Ogawa <sup>a</sup> ) in 1948. Possibility of ferromatrinas <sup>b</sup> ) in 1949.  b phase VII VI V	ramic spec oelectricity	imens of W	as pointe	d out b	y   a)48N1,48N b)49M2
The anomalous dielectric properties of cer by Ogawa <sup>a</sup> ) in 1948. Possibility of ferromatrinas <sup>b</sup> ) in 1949.  b phase VII VI V  state Fa)		, 111 VV O <sub>3</sub> W	O <sub>3</sub> were das pointe	liscovere d out b	y   a)48N1,48N b)49M2   a)49M2
The anomalous dielectric properties of cerby Ogawa <sup>a</sup> ) in 1948. Possibility of ferromatric phase VII VI V state Fa)  Crystal monosystem Clinic*b) clinic*b	IV ortho-	III	II	d out b	y   a)48N1,48N b)49M2 a)49M2 b)60T1
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror (MATTHIAS*) in 1949.  b phase VII VI V state F*)  crystal monoclinic*b clinic* monoclinic* in space	IV	III tetra- gonald)	as pointe	d out b	y   a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror phase VII VI V state F**)  crystal monoclinic**b) clinic*b) clinic* monoclinic* page P21/n°;	IV ortho-	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> )	II tetra-	I tetra-	a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2 d)52K1
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror of the properties of cerby Ogawa*) in 1949.  Phase VII VI V   State F**)  Crystal monoclinic**b) clinic*b) clinic*c respace group  P21/nc - C2n  P2 - C2n  P300*	IV  ortho- rhombic*)	tetra- gonald) P4/nmmd) -D <sup>2</sup> <sub>4h</sub>	tetra-gonalb)	d out b	y   a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2
The anomalous dielectric properties of cer by Ogawa*) in 1948. Possibility of ferror Matthias*) in 1949.  Phase VII VI V State F*)  Crystal monoclinic**b clinic*) monoclinic* respace group  P21/nc)  P21/nc)  P21/nc)  P21/nc)  P21/nc)  P21/nc)  P330e)  Tmelt = 1473 °C	IV  ortho- rhombic*)	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> )	tetra-gonalb)	d out b	a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2 d)52K1
The anomalous dielectric properties of cerby Ogawa³) in 1948. Possibility of ferror Matthias in 1949.  Phase VII VI V State F³) clinic³) clinic³) root clinic° r	IV  ortho- rhombicb)	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>4h</sub> 0e) 910	tetra-gonalb)	d out b	a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2 d)52K1 e)56S1 21J1 04S1
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror Matthasb) in 1949.  phase VII VI V   state F*)  crystal monoclinic*b) clinicb) clinicc rollinicc roll	IV  ortho- rhombicb)	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>4h</sub> 0e) 910	tetra-gonalb)	d out b	9   a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2 d)52K1 e)56S1
The anomalous dielectric properties of cerby Ogawa <sup>a</sup> ) in 1948. Possibility of ferror by Ogawa <sup>a</sup> ) in 1949. Possibility of ferror phase VII VI V state Fa)  crystal monoclinic*b) clinicb) cliniccc respective monocliniccb phase Clinic*b clinicb phase $\Theta$ $\Theta$ $\Theta$ $\Theta$ $\Theta$ $\Theta$ $\Theta$ $\Theta$ $\Theta$ $\Theta$	IV  ortho- rhombicb)	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>4h</sub> 0e) 910	tetra-gonalb)	d out b	a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2 d)52K1 e)56S1 21J1 04S1 60T1
The anomalous dielectric properties of cerby Ogawa³) in 1948. Possibility of ferror Matthias³) in 1949.  by Phase VII VI V State F³)  crystal monoclinic*b clinic³) clinic° r  space group P2₁/n°)  Θ -40°) 17°) 330°)  Tmelt = 1473 °C.  ε = 7.157 · 10³ kg m⁻³ at RT.  α = 7.30 Å, b = 7.53 Å, c = 7.68 Å, β = 90  Transparent, bluish green.  Crystal growth: Sublimation method.  Crystal form: Plate-like.	IV  ortho- rhombicb)  74	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>4h</sub> 0e) 910	tetra-gonalb)	d out b	a)48N1,48N b)49M2 a)49M2 b)60T1 c)60T2 d)52K1 e)56S1 21J1 04S1
The anomalous dielectric properties of cerby Ogawa³) in 1948. Possibility of ferror Matthias³) in 1949.  by Phase   VII   VI   V   V    state   F³)   Crystal   mono-clinic*b   clinic²)   respect   F²(½n°)    space   group   P²(½n°)    6	ortho-rhombicb)  74  3° 54' at 30	tetra- gonald) P4/nmmd) -D <sup>2</sup> <sub>4h</sub> Oe) 910	tetra-gonalb)	d out b	9 (a) 48N1,48N b) 49M2 e) 49M2 b) 60T1 c) 60T2 d) 52K1 e) 56S1 21J1 04S1 60T1
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror Matthas*) in 1949.  phase VII VI V phase crystal monoclinic*b) clinic*b) clinic*b) clinic*c row respace group $-40^{\text{b}}$ $-7.53^{\text{c}}$ $-7.53^{$	ortho-rhombicb)  74  3° 54' at 30	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>4h</sub> 0e) 910	tetra-gonalb)	d out b	9 (a) 48N1,48N b) 49M2 a) 49M2 b) 60T1 c) 60T2 d) 52K1 e) 56S1 21J1 04S1 60T1 51U1, 56T2,
The anomalous dielectric properties of cerby Ogawa³) in 1948. Possibility of ferror Matthias³) in 1949.  phase VII VI V V  state F³)  Crystal monoclinic*b) clinic³) rocclinic°	ortho-rhombicb)  74  3° 54' at 30	tetra- gonald) P4/nmmd) -D <sup>2</sup> <sub>4h</sub> Oe) 910	tetra-gonalb)	d out b	9 (a) 48N1,48N b) 49M2 e) 49M2 b) 60T1 c) 60T2 d) 52K1 e) 56S1 21J1 04S1 60T1
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror Matthias*) in 1949.  phase VII VI V Phase State Fa)  crystal monoclinic*b) clinicb) clinicc) respace group $O(10^{-10})$ $O(10^$	IV orthorhombicb) 74 9° 54' at 30	tetra- gonal <sup>d</sup> )  P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>4h</sub> Oe) 910	tetra-gonalb)	d out b	9 (a) 48N1,48N b) 49M2 a) 49M2 b) 60T1 c) 60T2 d) 52K1 e) 56S1 21J1 04S1 60T1 51U1, 56T2,
The anomalous dielectric properties of cerby Ogawa³) in 1948. Possibility of ferror Matthas³) in 1949.  by Phase VII VI V V State F³)  crystal monosystem clinic*b) clinicb) clinicc II  space group P2₁/nc)  Θ -40b) 17b) 330e)  Tmelt = 1473 °C.  ε = 7.157 · 10³ kg m -³ at RT.  α = 7.30 Å, b = 7.53 Å, c = 7.68 Å, β = 90  Transparent, bluish green.  Crystal growth: Sublimation method.  Crystal structure: Fig. 747, 748; Tab. 79; Fighase VII VI V IV III Z  Lattice distortion: Tab. 80.  Thermal expansion: Fig. 750 ··· 754.  Dielectric constant: κ = 100 ··· 300 at liquid No reliable dielectric measurements could be constant: because of high electrical candidate.	IV orthorhombicb) 74 0° 54' at 30 ig. 749.	tetra- gonal <sup>d</sup> ) P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>th</sub> 10e) 910	tetra-gonalb)	d out by I tetragonalb)	9 (a) 48N1,48N b) 49M2 a) 49M2 b) 60T1 c) 60T2 d) 52K1 e) 56S1 21J1 04S1 60T1 51U1, 56T2,
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror Matthas*) in 1949.  phase VII VI V phase State F**)  crystal monoclinic**) $Clinic*$ $Clini$	orthorhombic)  74  3° 54' at 30  ig. 749.  I air tempe carried out	tetra- gonal <sup>d</sup> ) P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>th</sub> 10e) 910  Parature. at and above	tetra-gonalb)	d out by I tetragonalb)	*)48N1,48N *)49M2 *)60T1 *)60T2 d)52K1 *)56S1 21J1 04S1 60T1 51U1, 56T2, 59S3
The anomalous dielectric properties of cerby Ogawa*) in 1948. Possibility of ferror Matthas*) in 1949.  phase VII VI V phase State F*)  crystal monoclinic*b) clinicb) clinicc) respace group $P2_1/n^c$ $C^2_{2h}$ $\Theta$ $-40^b$ $17^b$ $330^c$ $T_{melt} = 1473 °C$ . $\theta$ $= 7.53 Å$ , $\theta$ $= 7.68 Å$ , $\theta$ $= 90$ $T_{ransparent}$ , bluish green.  Crystal growth: Sublimation method. Crystal structure: Fig. 747, 748; Tab. 79; Fighase VII VI V IV III Z 4 8 8 8 Lattice distortion: Tab. 80. Thermal expansion: Fig. 750 $\cdots$ 754. Dielectric constant: $\kappa$ $= 100 \cdots 300$ at liquid No reliable dielectric measurements could be of ture because of high electrical and $\theta$ and $\theta$ are the substantial and $\theta$ are the sub	orthorhombic)  74  3° 54' at 30  ig. 749.  I air tempe carried out	tetra- gonal <sup>d</sup> ) P4/nmm <sup>d</sup> ) -D <sup>2</sup> <sub>th</sub> 10e) 910  Parature. The rature at and above the perature.	tetra-gonalb)  De) 123	d out by I tetragonalby Oe) °C	*)48N1,48N *)49M2 *)49M2 *)60T1 *)60T2 d)52K1 *)56S1  21 J1 04S1 60T1  51U1, 56T2, 59S3  60T1

## V Index of substances - Substanzenverzeichnis

This index consists of two parts: part A is for pure compounds (including complex compounds such as  $Pb(Co_{1/2}Nb_{1/2})O_3$  or  $Na_{0.5}Bi_{4.5}Ti_4O_{15}$ ) and part B is for solid solutions.

V A: In the 1st column the substances are ordered according to the alphabetically arranged gross formula. When their names (e.g. Rochelle salt) and/or their abbreviated names (e.g. TGS) are widely used, they are also included in this column. In the gross formula the numbers of the elements are determined by simple addition.

Compounds containing water of crystallization are, however, listed twice: (1) H and O of the water molecules are included in the gross formula, (2) the water molecules are attached separately to the gross formula. For instance, Rochelle salt is listed in the 1st column as C<sub>4</sub>H<sub>4</sub>KNaO<sub>6</sub> · 4H<sub>2</sub>O, C<sub>4</sub>H<sub>12</sub>KNaO<sub>10</sub> and also as Rochelle salt, RS, Seignette salt.

Crystals in which H is replaced by D (e.g.

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Crystals in which H is replaced by D (e.g.  $\mathrm{KD_2PO_4}$ ) are not listed separately, since data on their properties are presented in the same section as the data on the non-deuterated crystals (e.g.

 $KH_2PO_4$ . VB: In the 1st column the gross formula of each end material of a solid solution (e.g. BaTiO<sub>3</sub> or PbTiO<sub>3</sub>) for the solid solution BaTiO<sub>3</sub>-PbTiO<sub>3</sub>) is listed in the same manner as in the case of pure compounds. Thus the solid solution BaTiO<sub>3</sub>-PbTiO<sub>3</sub> can be found in the 2nd column by looking first for either BaO<sub>3</sub>Ti or O<sub>3</sub>PbTi in the 1st column of Part B. If the solid solution is expressed by the formula such as  $(Sb_xBi_{1-x})SI$ , the end material can be obtained by putting x equal to either 0 or 1. When solid solutions have abbreviated names (e.g. KTN), these are also included in the 1st column.

Since in general one section corresponds to one substance in this volume, the 3rd column gives the section number and the 4th column gives the first page of the section.

Dieses Verzeichnis besteht aus zwei Teilen: Teil A enthält die reinen Verbindungen (einschließlich komplexer Verbindungen wie Pb(Co<sub>1/2</sub>Nb<sub>1/2</sub>)O<sub>3</sub> oder Na<sub>0.5</sub>Bi<sub>4.5</sub>Ti<sub>4</sub>O<sub>15</sub>) und Teil B enthält die Mischkristalle.

V A: In der 1. Spalte sind die Substanzen nach der alphabetisch angeordneten Bruttoformel aufgeführt. Wenn ihre Namen (z. B. Seignette-Salz) und/oder ihre abgekürzten Bezeichnungen (z. B. TGS) häufig gebraucht werden, sind auch sie in dieser Spalte zu finden. In der Bruttoformel ist die Anzahl jedes Elements durch einfache Addition bestimmt.

Verbindungen, die Kristallwasser enthalten, sind zweimal aufgeführt: 1. H und O der Wassermoleküle sind in der Bruttoformel enthalten. 2. die Wassermoleküle werden getrennt der Bruttoformel hinzugefügt (z. B. Seignette-Salz ist in der 1. Spalte aufgeführt als C<sub>4</sub>H<sub>4</sub>KNaO<sub>10</sub> · 4H<sub>2</sub>O, C<sub>4</sub>H<sub>12</sub>KNaO<sub>10</sub> und auch als Rochelle-Salz, RS, Seignette-Salz).

Kristalle, in denen H durch D ersetzt ist (z. B. KD2PO4), werden nicht gesondert aufgeführt. Daten von ihren Eigenschaften erscheinen in demselben Abschnitt an der gleichen Stelle wie die Daten von den nicht deuterierten Kristallen (z.B. KH<sub>2</sub>PO<sub>4</sub>). V B: In der 1. Spalte ist die Bruttoformel jeder Endsubstanz einer Mischkristallreihe (z. B. BaTiO, oder PbTiO, für die Mischkristallreihe BaTiO, PbTiO<sub>3</sub>) in derselben Weise aufgeführt wie im Fall von reinen Verbindungen. So kann die Mischkristallreihe BaTiO<sub>3</sub>-PbTiO<sub>3</sub> in der zweiten Spalte gefunden werden, wenn man zunächst entweder BaO<sub>3</sub>Ti oder O<sub>3</sub>PbTi in der ersten Spalte von Teil B sucht. Wenn die Mischkristallreihe durch die Formel (Sb<sub>x</sub>Bi<sub>1-x</sub>)SI ausgedrückt wird, kann man die Endsubstanz finden, indem man x gleich 0 oder 1 setzt. Wenn Mischkristalle abgekürzte Namen haben (z. B. KTN), sind diese auch in der 1. Spalte

Da in diesem Band jeweils ein Abschnitt einer Substanz entspricht, gibt die 3. Spalte die Abschnittsnummer und die 4. Spalte die erste Seite des Abschnitts an

#### VA Pure compounds

Gross formula ADP	Chemical formula	Nr.	1 5
AgC <sub>2</sub> H <sub>5</sub> N <sub>2</sub> O <sub>5</sub> Ag <sub>2</sub> H <sub>5</sub> IO <sub>6</sub> AgNbO <sub>3</sub> AgO <sub>3</sub> Ta AgO <sub>3</sub> V AlCH <sub>6</sub> NO <sub>8</sub> S <sub>2</sub> · 12H <sub>2</sub> O AlCH <sub>6</sub> N <sub>3</sub> O <sub>8</sub> S <sub>2</sub> · 6H <sub>2</sub> O AlCH <sub>18</sub> N <sub>2</sub> O <sub>14</sub> S <sub>2</sub> AlCH <sub>30</sub> NO <sub>20</sub> S <sub>2</sub> AlCH <sub>6</sub> N <sub>9</sub> Se <sub>2</sub> · 6H <sub>2</sub> O AlCH <sub>6</sub> N <sub>9</sub> O <sub>8</sub> Se <sub>2</sub> · 6H <sub>2</sub> O AlCH <sub>18</sub> N <sub>2</sub> O <sub>14</sub> Se <sub>2</sub> AlCH <sub>30</sub> NO <sub>20</sub> Se <sub>2</sub>	NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub> NH <sub>2</sub> CH <sub>2</sub> COOH · AgNO <sub>3</sub> Ag <sub>2</sub> H <sub>3</sub> IO <sub>6</sub> AgNbO <sub>3</sub> AgTaO <sub>3</sub> AgVO <sub>3</sub> CH <sub>3</sub> NH <sub>3</sub> Al(SO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O C(NH <sub>2</sub> ) <sub>3</sub> Al(SO <sub>4</sub> ) <sub>2</sub> · 6H <sub>2</sub> O C(NH <sub>2</sub> ) <sub>3</sub> Al(SO <sub>4</sub> ) <sub>2</sub> · 6H <sub>2</sub> O CH <sub>3</sub> NH <sub>3</sub> Al(SO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O CH <sub>3</sub> NH <sub>3</sub> Al(SO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O CH <sub>3</sub> NH <sub>3</sub> Al(SeO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O C(NH <sub>2</sub> ) <sub>3</sub> Al(SeO <sub>4</sub> ) <sub>2</sub> · 6H <sub>2</sub> O C(NH <sub>2</sub> ) <sub>3</sub> Al(SeO <sub>4</sub> ) <sub>2</sub> · 6H <sub>2</sub> O C(NH <sub>2</sub> ) <sub>3</sub> Al(SeO <sub>4</sub> ) <sub>2</sub> · 6H <sub>2</sub> O C(NH <sub>2</sub> ) <sub>3</sub> Al(SeO <sub>4</sub> ) <sub>2</sub> · 6H <sub>2</sub> O CH <sub>3</sub> NH <sub>3</sub> Al(SeO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O	13A-7 29A-1 35-22 35-16 35-18 35-20 18A-4 19A-1 19A-1 18A-4 18A-10 19A-5 19A-5 19A-5	Pag  143 191 209 207 207 208 158 161 161 158 161 166 166
sH <sub>2</sub> KO,	CsH <sub>2</sub> AsO <sub>4</sub> KH <sub>2</sub> AsO <sub>4</sub>	35–14 13A–6 13A–4	205 143 141

Gross formula	Chemical formula	Nr.	Page
AsH <sub>6</sub> NO <sub>4</sub>	NH <sub>4</sub> H <sub>2</sub> AsO <sub>4</sub>	13A-8	147
AsH <sub>2</sub> O <sub>4</sub> Rb	RbH <sub>2</sub> AsO <sub>4</sub>	13A-5	143
Azobenzene	$C_{12}H_{10}N_2$	37–5	216
Azoxybenzene	$C_{12}H_{10}N_2O$	37–6	216
B <sub>7</sub> BrCd <sub>3</sub> O <sub>13</sub>	Cd <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Br	9A-18	120
B <sub>7</sub> BrCo <sub>3</sub> O <sub>13</sub>	Co <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Br	9A-14	119
B <sub>7</sub> BrCr <sub>3</sub> O <sub>13</sub>	$Cr_3B_7O_{13}Br$	9A-11	118
B <sub>7</sub> BrCu <sub>3</sub> O <sub>13</sub>	Cu <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Br	9A-16	119
B <sub>7</sub> BrFe <sub>3</sub> O <sub>13</sub>	Fe <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Br	9A-13	119
$B_7BrMg_3O_{13}$ $B_7BrMn_3O_{13}$	Mg <sub>3</sub> B <sub>7</sub> O <sub>18</sub> Br	9A-10	118
B <sub>7</sub> BrNi <sub>3</sub> O <sub>13</sub>	Mn <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Br	9A-12	119
$B_7BrO_{13}Cr_3$	$Ni_3B_7O_{13}Br$ $Zn_3B_7O_{13}Br$	9A-15	119
B <sub>6</sub> Ca <sub>2</sub> H <sub>10</sub> O <sub>16</sub>	$Ca_{2}B_{6}O_{11} \cdot 5H_{2}O$	9A-17	120
$B_6Ca_2O_{11} \cdot 5H_2O$	$Ca_2B_6O_{11} \cdot 5H_2O$	21A-1 21A-1	173
B <sub>7</sub> Cd <sub>3</sub> ClO <sub>13</sub>	Cd <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	9A-9	173
B <sub>7</sub> Cd <sub>3</sub> IO <sub>13</sub>	Cd <sub>3</sub> B <sub>7</sub> O <sub>13</sub> I	9A-25	118 122
B <sub>7</sub> ClCo <sub>3</sub> O <sub>13</sub>	Co <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	9A-25 9A-5	117
B <sub>7</sub> ClCr <sub>3</sub> O <sub>13</sub>	Cr <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	9A-2	116
B <sub>7</sub> ClCu <sub>3</sub> O <sub>13</sub>	Cu <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	9A-7	118
B <sub>2</sub> ClFe <sub>3</sub> O <sub>13</sub>	Fe <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	9A-4	117
$B_7ClMg_3O_{13}$	$Mg_3B_7O_{13}Cl$	9A-1	115
$B_7ClMn_3O_{13}$	$Mn_3B_7O_{13}Cl$	9A-3	117
B <sub>7</sub> ClNi <sub>3</sub> O <sub>13</sub>	Ni <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	9A-6	117
B <sub>7</sub> ClO <sub>13</sub> Zn <sub>3</sub>	$Zn_3B_7O_{13}Cl$	9A-8	118
B <sub>7</sub> Co <sub>3</sub> IO <sub>13</sub>	$Co_3B_7O_{15}I$	9A-22	121
B <sub>7</sub> Cr <sub>3</sub> IO <sub>13</sub>	$Cr_3B_7O_{13}I$	9A-19	120
B <sub>7</sub> Fe <sub>3</sub> IO <sub>13</sub>	$\text{Fe}_{3}\text{B}_{7}\text{O}_{13}\text{I}$	9A-21	120
B <sub>7</sub> IMn <sub>8</sub> O <sub>13</sub>	$Mn_3B_7O_{13}I$	9A-20	120
B <sub>7</sub> INi <sub>3</sub> O <sub>13</sub>	Ni <sub>3</sub> B <sub>7</sub> O <sub>13</sub> I	9A-23	121
B <sub>7</sub> IO <sub>13</sub> Zn <sub>3</sub>	$Zn_3B_7O_{13}I$	9A24	121
Ba <sub>4</sub> Bi <sub>2</sub> Fe <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub>	Ba <sub>4</sub> Bi <sub>2</sub> Fe <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub>	5C-g1	104
BaBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> BaBi <sub>3</sub> NbO <sub>12</sub> Ti <sub>2</sub>	BaBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>	7A-7	109
$BaBi_2O_9Ta_2$	BaBi <sub>3</sub> Ti <sub>2</sub> NbO <sub>12</sub>	7A-12	110
BaBi <sub>4</sub> O <sub>15</sub> Ti <sub>4</sub>	BaBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub> BaBi <sub>4</sub> Ti <sub>4</sub> O <sub>15</sub>	7A-8	109
Ba <sub>2</sub> Bi <sub>4</sub> O <sub>18</sub> Ti <sub>5</sub>	$Ba_{2}Bi_{4}Ti_{5}O_{18}$	7A-14 7A-19	111
BaC <sub>18</sub> Ca <sub>2</sub> H <sub>30</sub> O <sub>12</sub>	$Ca_2Ba(CH_3CH_2COO)_6$	26A-3	112 184
$Ba_4Ce_2Nb_8Ni_2O_{30}$	$Ba_4Ce_2Ni_2Nb_8O_{30}$	5C-d1	104
Ba <sub>4</sub> Fe <sub>2</sub> Gd <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub>	Ba <sub>4</sub> Gd <sub>2</sub> Fe <sub>2</sub> NbO <sub>30</sub>	5C-g4	104
$Ba_2Fe_3Nb_7Nd_4O_{30}$	$Ba_2Nd_4Fe_3Nb_7O_{30}$	5C-h1	104
$Ba_4Fe_2Nb_8Nd_2O_{30}$	Ba, Nd, Fe, Nb, O,	5C-g2	104
Ba <sub>6</sub> FeNb <sub>9</sub> O <sub>30</sub>	$Ba_{6}FeNb_{9}O_{30}$	5C-f1	104
Ba <sub>2</sub> Fe <sub>8</sub> Nb <sub>7</sub> O <sub>30</sub> Sm <sub>4</sub>	$Ba_2Sm_4Fe_3Nb_7O_{30}$	5C-h2	104
$Ba_4Fe_2Nb_8O_{30}Sm_2$	$Ba_4Sm_2Fe_2Nb_8O_{30}$	5C-g3	104
Ba <sub>2</sub> KNb <sub>5</sub> O <sub>15</sub>	KBa <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub>	5C-b3	103
Ba <sub>9</sub> MgNb <sub>14</sub> O <sub>45</sub>	Ba <sub>9</sub> MgNb <sub>14</sub> O <sub>45</sub>	5Ce1	104
Ba <sub>2</sub> NaNb <sub>5</sub> O <sub>15</sub>	NaBa <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub>	5C-b2	103
Ba <sub>2</sub> Nb <sub>8</sub> Nd <sub>4</sub> Ni <sub>2</sub> O <sub>30</sub>	Ba <sub>2</sub> Nd <sub>4</sub> Ni <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub>	5Cc1	104
Ba <sub>2</sub> Nb <sub>8</sub> Ni <sub>2</sub> O <sub>30</sub> Sm <sub>4</sub>	Ba <sub>2</sub> Sm <sub>4</sub> Ni <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub>	5C-c2	104
Ba <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub> Rb Ba <sub>6</sub> Nb <sub>8</sub> O <sub>30</sub> Ti <sub>2</sub>	RbBa <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub>	5C-b5	103
$Ba_{6}^{ND_{8}O_{30}} I_{12}$ $BaNb_{1.5}O_{5.25}Zr_{0.25}$	Ba <sub>6</sub> Ti <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub>	5C-j1	104
BaO <sub>6</sub> Ta <sub>2</sub>	BaZr <sub>0.25</sub> Nb <sub>1.5</sub> O <sub>5.25</sub> BaTa <sub>2</sub> O <sub>6</sub>	5C-j3	105 98
BaO <sub>3</sub> Ti	BaTiO <sub>3</sub>	5A-3 1A-8	98 51
BaO <sub>3</sub> Zr	BaZrO <sub>3</sub>	1A-6 1A-12	61
BeC <sub>6</sub> F <sub>4</sub> H <sub>17</sub> N <sub>3</sub> O <sub>6</sub>	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> H <sub>2</sub> BeF <sub>4</sub>	28A-3	190
BeF <sub>4</sub> H <sub>8</sub> N <sub>2</sub>	$(NH_4)_2BeF_4$	14A-2	154
BiBrS	BiSBr	10A-7	126
BiBrSe	BiSeBr	10A-10	127
Bi <sub>2</sub> CaNb <sub>2</sub> O <sub>9</sub>	CaBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>	7A-3	107
Bi <sub>2</sub> CaO <sub>5</sub> Ta <sub>2</sub> Bi <sub>4</sub> CaO <sub>15</sub> Ti <sub>4</sub>	CaBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub> CaBi <sub>4</sub> Ti <sub>4</sub> O <sub>15</sub>	7A-4	108 112

BiCIS BiCISe BisClSe BisFe4NbeNd4O30 BiFeO3 BiFeO3 BiFeO3 BiFeO3 BiFeO3 BiFeO3 BiSSCI BiSGCI BisSeCI BisPo3 BiSH3Ti3 GAO15 BiSIS BISIS BISI BISIS BISI	Nr. 10A-6 10A-9 5C-i2 1A-15 7A-18 10A-8	Page 125 126 104 63
BiClSe  Bi <sub>2</sub> Fe <sub>4</sub> Nb <sub>6</sub> Nd <sub>4</sub> O <sub>30</sub> BiFeO <sub>3</sub> Bi <sub>3</sub> GaO <sub>15</sub> Ti <sub>3</sub> BiSS  BiSS  BiSS  BiSS  BiSS  BiSS  BiSS  BiSSI  BiSSe  BiK <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub> Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti  Bi <sub>4.5</sub> K <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb  Bi <sub>3</sub> Nb <sub>0</sub> O <sub>2</sub> Pb  Bi <sub>3</sub> Nb <sub>0</sub> O <sub>3</sub> Ti  Bi <sub>2</sub> O <sub>3</sub> PbTa <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> SpTi <sub>4</sub> Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub> Bi <sub>5</sub> O <sub>9</sub> TaTi  Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub> Bi <sub>5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>2</sub> O <sub>1</sub> STTi  Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub> Bi <sub>5</sub> O <sub>15</sub> Ti  Bi <sub>4</sub> O <sub>15</sub> SrTi  Bi <sub>4</sub> O <sub>15</sub> SrTi  Bi <sub>4</sub> O <sub>15</sub> Ti  Bi <sub>5</sub> O <sub>1</sub> Ti  Bi <sub>5</sub> O <sub>1</sub> Ti  Bi <sub>5</sub> O <sub>1</sub> Ti  Bi <sub>6</sub> O <sub>15</sub> Ti  Bi <sub>6</sub> O <sub>15</sub> Ti  Bi <sub>6</sub> O <sub>15</sub> Ti  Bi <sub>7</sub> O <sub>16</sub> Ti  Bi <sub>7</sub> O <sub>16</sub> Ti  Bi <sub>7</sub> O <sub>16</sub> Ti  Bi <sub>7</sub> O <sub>17</sub> Ti  Bi <sub>7</sub> O <sub>18</sub> Ti  Bi <sub>7</sub> D <sub>1</sub> Ti  Bi <sub></sub>	10A-9 5C-i2 1A-15 7A-18	126 104
BiFeO <sub>3</sub> Bi <sub>5</sub> GaO <sub>15</sub> Ti <sub>3</sub> BiIS BiIS BiISe BiK <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub> Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> K <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb Bi <sub>3</sub> NbO <sub>1</sub> PbTi <sub>2</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub> Bi <sub>3</sub> O <sub>9</sub> PbTa <sub>2</sub> Bi <sub>4</sub> O <sub>18</sub> Pb <sub>2</sub> Ti <sub>5</sub> Bi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub> Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub> Bi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub> Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub> Bi <sub>2</sub> O <sub>9</sub> TaTi Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub> Bi <sub>2</sub> O <sub>1</sub> Ti <sub>4</sub> Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub> Bi <sub>5</sub> O <sub>1</sub> Ti <sub>4</sub> Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub> Bi <sub>5</sub> O <sub>1</sub> Ti <sub>4</sub> Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub> Br <sub>5</sub> C <sub>4</sub> H <sub>12</sub> HgP BrSSb BrSbSe  BiSeI BiBi <sub>4</sub> Ti <sub>3</sub> GaO <sub>15</sub> BiSeI K <sub>2</sub> BiNb <sub>5</sub> O <sub>15</sub> K <sub>2</sub> BiNb <sub>5</sub> O <sub>15</sub> K <sub>2</sub> BiNb <sub>5</sub> O <sub>15</sub> (K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO <sub>3</sub> K <sub>2</sub> BiS <sub>1</sub> I <sub>2</sub> Di <sub>15</sub> K <sub>2</sub> BiNb <sub>1</sub> O <sub>15</sub> K <sub>2</sub> BiNb <sub>1</sub> O <sub>15</sub> K <sub>3</sub> Bi <sub>4.5</sub> Ti <sub>4</sub> O <sub>15</sub> Na <sub>0.5</sub> Bi <sub>4.5</sub> Ti <sub>4</sub> O <sub>15</sub> Na <sub>0.5</sub> Bi <sub>4.5</sub> Ti <sub>4</sub> O <sub>15</sub> PbBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> BiBi <sub>2</sub> Ti <sub>2</sub> NbO <sub>12</sub> Sr Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> BiBi <sub>2</sub> Ti <sub>3</sub> O <sub>9</sub> Sr Bi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub> Sr Bi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub> Bi <sub>2</sub> O <sub>1</sub> Ti <sub>4</sub> Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub> Bi <sub>2</sub> O <sub>11</sub> Ti <sub>4</sub> Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub> Br <sub>5</sub> C <sub>4</sub> H <sub>12</sub> HgP BrH BrSSb BrSbSe	5C-i2 1A-15 7A-18	104
Bireo   Bireo   Bireo   Bireo   Bireo	1A-15 7A-18	
BiIS BiISe BiK <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub> Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> K <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb Bi <sub>3</sub> NbO <sub>12</sub> PbTi <sub>2</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Sr Bi <sub>3</sub> NbO <sub>9</sub> Ti Bi <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> PsTi <sub>4</sub> Bi <sub>4</sub> O <sub>16</sub> Sr <sub>7</sub> Ta <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> Sr <sub>7</sub> Ti <sub>5</sub> Bi <sub>2</sub> O <sub>9</sub> TaTi Bi <sub>2</sub> O <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti Bi <sub>2</sub> D <sub>1</sub> Ti	7A-18	63
Bil Se BiK <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub> Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> K <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb Bi <sub>3</sub> NbO <sub>1</sub> PpbTi <sub>2</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Sr Bi <sub>3</sub> NbO <sub>9</sub> Ti Bi <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> PptTi <sub>4</sub> Bi <sub>4</sub> O <sub>16</sub> Ppb <sub>7</sub> Ti Bi <sub>4</sub> O <sub>18</sub> Ppb <sub>7</sub> Ti Bi <sub>4</sub> O <sub>18</sub> Ppb <sub>7</sub> Ti Bi <sub>4</sub> O <sub>18</sub> Pps <sub>7</sub> Ti Bi <sub>4</sub> O <sub>18</sub> Pps <sub>7</sub> Ti Bi <sub>4</sub> O <sub>18</sub> Pps <sub>7</sub> Ti Bi <sub>4</sub> O <sub>15</sub> SrTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> SrTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> Sr <sub>7</sub> Ti Bi <sub>4</sub> O <sub>15</sub> Sr <sub>7</sub> Ti Bi <sub>4</sub> O <sub>15</sub> Sr <sub>1</sub> Ti Bi <sub>4</sub> O <sub>15</sub> Sr <sub>1</sub> Ti Bi <sub>4</sub> O <sub>15</sub> Sr <sub>2</sub> Ti Bi <sub>3</sub> O <sub>3</sub> TaTi Bi <sub>2</sub> O <sub>1</sub> Ti Bi <sub>4</sub> O <sub>12</sub> Ti Bi <sub>2</sub> O <sub>11</sub> Ti Bi <sub>4</sub> O <sub>12</sub> Ti Bi <sub>5</sub> O <sub>14</sub> Ti Bi <sub>4</sub> O <sub>15</sub> Ti Bi <sub>5</sub> O <sub>15</sub> Ti Bi <sub>6</sub> O <sub>1</sub>		
BiK <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub> Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> K <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub> Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Sr Bi <sub>3</sub> NbO <sub>12</sub> PbTi <sub>2</sub> Bi <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub> Bi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> SrTi <sub>4</sub> Bi <sub>4</sub> O <sub>15</sub> Sr <sub>1</sub> Ti <sub>5</sub> Bi <sub>5</sub> O <sub>7</sub> Ta <sub>2</sub> Bi <sub>4</sub> O <sub>15</sub> Sr <sub>1</sub> Ti <sub>5</sub> Bi <sub>5</sub> O <sub>7</sub> Ta <sub>7</sub> Ti Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub> O <sub>17</sub> Ta <sub>7</sub> Bi <sub>5</sub>		112
Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti	10A-11	126 127
Bi <sub>4.5</sub> K <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub>	5C-a2	102
Bi <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti   Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub>   Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb   Bi <sub>3</sub> NbO <sub>12</sub> PbTi <sub>2</sub>   Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Sr   Bi <sub>3</sub> NbO <sub>3</sub> Ti   Bi <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub>   Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub>   Bi <sub>4</sub> O <sub>16</sub> Pb <sub>2</sub> Ti <sub>5</sub>   Bi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub>   Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub>   Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub>   Bi <sub>4</sub> O <sub>18</sub> Sr <sub>2</sub> Ti <sub>5</sub>   Bi <sub>3</sub> O <sub>9</sub> TaTi   Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>   Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>   Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>   Br <sub>3</sub> C <sub>4</sub> H <sub>12</sub> HgN   BrSSb   BrSbSe	1B1–i	64
Bi <sub>4.5</sub> Na <sub>0.5</sub> O <sub>15</sub> Ti <sub>4</sub>   Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb   Bi <sub>3</sub> NbO <sub>12</sub> PbTi <sub>2</sub>   PbBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>   PbBi <sub>3</sub> Ti <sub>2</sub> NbO <sub>12</sub>   SrBi <sub>2</sub> NbO <sub>9</sub> Sr   SrBi <sub>2</sub> NbO <sub>9</sub> Sr   Bi <sub>3</sub> NbO <sub>9</sub> Ti   Bi <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub>   PbBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   PbBi <sub>4</sub> Ti <sub>4</sub> O <sub>15</sub>   PbBi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub>   PbBi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub>   PbBi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   SrBi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub>   SrBi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub>   SrBi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   SrBi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   SrBi <sub>4</sub> O <sub>15</sub> Sr <sub>2</sub> Ti <sub>5</sub>   SrBi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   SrBi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   SrBi <sub>4</sub> O <sub>15</sub> Ti <sub>4</sub> O <sub>15</sub>   Sr <sub>2</sub> Bi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   BiBi <sub>2</sub> TiTaO <sub>9</sub>   Bi <sub>2</sub> O <sub>11</sub> Ti <sub>4</sub>   Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>   Bi <sub>2</sub> O <sub>11</sub> Ti <sub>4</sub>   Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>   Bi <sub>2</sub> O <sub>11</sub> Ti <sub>0</sub>   Bi <sub>3</sub> O <sub>4</sub> H <sub>12</sub> HgP   Pc(H <sub>3</sub> ) <sub>4</sub> HgBr <sub>3</sub>   P(CH <sub>3</sub> ) <sub>4</sub> HgBr <sub>3</sub>   P	7B-4	114
Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb	1B1ii	64
PbBi <sub>3</sub> Ti <sub>2</sub> NbO <sub>12</sub>	7B-3	114
SrBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>   SrBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>   BiBi <sub>3</sub> NbO <sub>9</sub> Ti   Bi <sub>2</sub> O <sub>9</sub> PbTa <sub>2</sub>   PbBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   PbBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   PbBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   PbBi <sub>4</sub> Ti <sub>4</sub> O <sub>15</sub>   Pb <sub>2</sub> Bi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   SrBi <sub>2</sub> O <sub>9</sub> SrTa <sub>2</sub>   SrBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   SrBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   SrBi <sub>2</sub> Ta <sub>2</sub> O <sub>9</sub>   SrBi <sub>4</sub> Ti <sub>4</sub> O <sub>15</sub>   Sr <sub>2</sub> Bi <sub>4</sub> Ti <sub>5</sub> O <sub>18</sub>   BiBi <sub>2</sub> TiTaO <sub>9</sub>   BiBi <sub>2</sub> TiTaO <sub>9</sub>   Bi <sub>2</sub> O <sub>11</sub> Ti <sub>4</sub>   Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>   BiBi <sub>2</sub> Ti <sub>2</sub> TiO <sub>12</sub>   BiBi <sub>3</sub> Ti <sub>2</sub> TiO <sub>12</sub>   BiBi <sub>3</sub> Ti <sub>2</sub> TiO <sub>12</sub>   N(CH <sub>3</sub> ) <sub>4</sub> HgBr <sub>3</sub>   P(CH <sub>3</sub> ) <sub>4</sub> HgBr <sub>3</sub>   SbSBr   SbS	7A-9	109
Bi₂O₃PbTa₂ Bi₄O₁₅PbTi₄ Bi₄O₁₅PbZi₁₅ Bi₂O₃SrTa₂ Bi₄O₁₅SrTi₄ Bi₄O₁₅SrTi₄ Bi₄O₁₅SrZi₁₅ Bi₃O₃TaZi Bi₄O₁₅SrZi₁₅ Bi₃O₃TaZi Bi₃O₃TaZi Bi₃O₃TaZi Bi₃O₃TaZi Bi₂O₁Ti₄ Bi₄O₁₂Ti₃ Bi₃O₁Ti₄ Bi₄O₁₂Ti₃ Br₃C₄H₁₂HgN Br₃C₄H₁₂HgP BrH BrSSb BrSbSe BrSbSe  PbBi₂Ta₂O₃ PbBi₂Ta₂O₃ SrBi₄Ti₄O₁ѕ Sr₂Bi₄Ti₄O₁ѕ Br₃C₂Bi₄Ti₃O₁ѕ BiBi₂TiTaO₃ BiBi₂TiTaO₃ BiBi₃Ti₂TiO₁₂ N(CH₃)₄HgBr₃ P(CH₃)₄HgBr₃ F(CH₃)₄HgBr₃ SbSBr	7A-13 7A-5	110
Bi <sub>4</sub> O <sub>18</sub> PbTi <sub>4</sub>	7A-3 7A-1	108
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	7A-10	107 110
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7A-15	111
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7A-20	112
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7A-6	109
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7A-16	111
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	7A-21	113
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	7A-2	107
$\begin{array}{cccc} Br_3 C_4 Rr_{12} RgN & N(CH_3)_4 HgBr_3 \\ Br_3 C_4 H_{12} HgP & P(CH_3)_4 HgBr_3 \\ BrSSb & SbSBr \\ BrSbSe & SbSeBr \end{array}$	7A-22	113
BrH BrSSb BrSbSe  BrSbSe  H·Br SbSBr SbSBr SbSeBr	7A-11 24A-2	110
BrSSb SbSBr SbSeBr	24A-3	179 180
BrSbSe SbSeBr	35–12	203
5555	10A-1	122
	10A-3	124
$C_9CaCl_2H_{21}N_3O_5$ $(CH_3NHCH_2COOH)_3 \cdot CaCl_2$		
$Ca_2Pb(CH_3CH_3COO)$ .	32A-1	192
$C_{18}C_{2}C_{2}C_{30}C_{12}S_{1}$ $C_{a_2}S_{1}C_{12}C_{1$	26A-2 26A-1	183
$C_4Cl_3H_{12}HgN$ $N(CH_3)_4 \cdot HgCl_3$	24A-1	182
C <sub>4</sub> Cl <sub>2</sub> H <sub>10</sub> MnN <sub>2</sub> O <sub>4</sub> · 2H <sub>2</sub> O (NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>2</sub> · MnCl <sub>2</sub> · 2H <sub>2</sub> O (NH <sub>4</sub> CH <sub>2</sub> COOH) <sub>2</sub> · MnCl <sub>2</sub> · 2H <sub>2</sub> O (NH <sub>4</sub> CH <sub>2</sub> COOH) <sub>2</sub> · MnCl <sub>2</sub> · 2H <sub>2</sub> O	31A-1	178 192
$C_4Cl_2H_{14}MnN_2O_6$ $C_2ClH_6NO_2$ $C_4Cl_2H_{14}MnN_2O_6$ $C_4Cl_4H_{14}MnN_2O_6$	31A-1	192
C <sub>4</sub> Cl <sub>2</sub> H <sub>9</sub> NO <sub>4</sub> (CH, ClCOO) H NH	27A-1	184
CCrH <sub>8</sub> NO <sub>8</sub> S <sub>2</sub> · 12H <sub>8</sub> O CH NH Cr/SO 12H C	27A-2	184
CCrH <sub>6</sub> N <sub>8</sub> O <sub>8</sub> S <sub>8</sub> · 6H <sub>6</sub> O C(NH) Cr(SO) CH C	18A-6	160
CCrH <sub>30</sub> NO <sub>20</sub> S <sub>2</sub> CH <sub>3</sub> NH <sub>3</sub> Cr(SO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O	19A-2	164
$C(NH_{\bullet})_{\bullet}Cr(SO_{\bullet})_{\bullet} \cdot 6H_{\bullet}O$	18A-6	160
$C(NH_2)_3Cr(SeO_4)_2 \cdot 6H_2O$	19A-2 19A-6	164
$C(NH_2)_3Cr(SeO_4)_3 \cdot 6H_2O$	19A-6	167
	25A-1	180
$C_{2}CuH_{10}O_{8}$ $C_{6}FeH_{6}K_{4}N_{6}O_{3}$ $C_{4}Fe(CN)_{6} \cdot 3H_{2}O$ $C_{5}FeH_{6}N_{6}O_{3}$ $C_{5}FeH_{6}N_{6}O_{3}$ $C_{5}FeH_{6}N_{6}O_{3}$ $C_{5}Fe(CN)_{6}O_{5}O_{6}O_{6}O_{5}O_{6}O_{6}O_{6}O_{6}O_{6}O_{6}O_{6}O_{6$	25A-1	180
CFeH, NO, S, · 12H, O CH, NH, Fe/SO	22A-2	174
CFeH <sub>30</sub> NO <sub>20</sub> S <sub>2</sub> CHNH Fe(SO) <sup>2</sup> 1311 O	18A-7	160
Corcinate Sing R. Fe(CN) . 3H O	18A-7	160
CH <sub>2</sub> NH <sub>2</sub> Ga(SO <sub>2</sub> ) <sub>2</sub> · 12H <sub>2</sub> O CH <sub>3</sub> NH <sub>2</sub> Ga(SO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O	22A-2	174
$C(NH_2)_3Ga(SO_4)_3 \cdot 6H_2O$	18A-5 19A-3	160
$C(NH_2)_3Ga(SO_4)_3 \cdot 6H_2O$	19A-3	165 165
CH <sub>3</sub> NH <sub>3</sub> Ga(SO <sub>4</sub> ), · 12H <sub>2</sub> O	18A-5	160
	19A-7	167
C <sub>4</sub> H <sub>12</sub> HgI <sub>3</sub> N N(CH <sub>1</sub> ) HgI	19A-7	167
C <sub>6</sub> H <sub>6</sub> K <sub>4</sub> MnN <sub>6</sub> O <sub>3</sub> K.Mn(CN) 3H O	24A-4	180
$C_6H_6K_4N_6O_3O_5$ $K_4O_5(CN)_6 \cdot 3H_6O_5$	22A-1	174
R <sub>4</sub> Ru(CN) <sub>6</sub> · 3H <sub>2</sub> O	22A-4	176
NakC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O	22A-3	176
NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>6</sub> O	22 / 1	
$C_4H_8LiNO_6 \cdot H_2O$ $LiNH_4 \cdot C_4H_4O_6 \cdot H_2O$	33A-1	193
	33A-1 33A-1 34A-1	

#### V Substanzenverzeichnis

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Gross formula	Chemical formula	Nr.	Page
C <sub>4</sub> H <sub>10</sub> LiNO <sub>7</sub>	$LinH_4 \cdot C_4H_4O_6 \cdot H_2O$	34A-1	199
$C_4H_4LiO_6Tl \cdot H_2O$	LiTlC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·H <sub>2</sub> O	34A-2	199
C <sub>4</sub> H <sub>6</sub> LiO <sub>7</sub> Tl	LiTlC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · H <sub>2</sub> O	34A-2	199
$C_4H_8NNaO_6 \cdot 4H_2O$	$NaNH_4C_4H_4O_6 \cdot 4H_2O$	33A-2	197
$C_4H_{16}NNaO_{10}$	$NaNH_4C_4H_4O_6 \cdot 4H_2O$	33A-2	197
$C_4H_{11}N_3O_7$	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>2</sub> ·HNO <sub>3</sub>	30A-1	191
$C_6H_{17}N_3O_{10}S$	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·H <sub>2</sub> SO <sub>4</sub>	28A-1	185
$CH_6NO_8S_2V \cdot 12H_2O$	$CH_3NH_3V(SO_4)_2 \cdot 12H_2O$	18A-8	161
$CH_6N_3O_8S_2V \cdot 6H_2O$	$C(NH_2)_3V(SO_4)_2 \cdot 6H_2O$	19A-4	166
$CH_{18}N_3O_{14}S_2V$	(C(NH2)3V(SO4)2 · 6H2O	19A-4	166
$CH_{30}NO_{20}S_2V$	$CH_3NH_3V(SO_4)_2 \cdot 12H_2O$	18A-8	161
C <sub>6</sub> H <sub>17</sub> N <sub>3</sub> O <sub>10</sub> Se	$(NH_2CH_2COOH)_3 \cdot H_2SeO_4$	28A-2	190
CH <sub>4</sub> N <sub>2</sub> S	SC(NH <sub>2</sub> ) <sub>2</sub>	23A-1	177
C <sub>4</sub> H <sub>4</sub> NaO <sub>6</sub> Rb · 4H <sub>2</sub> O	NaRbC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O	33A-3	198
C4H12NaO10Rb	$NaRbC_4H_4O_6 \cdot 4H_2O$	33A-3	198
CH <sub>6</sub> InNO <sub>8</sub> S <sub>2</sub> · 12H <sub>2</sub> O	$CH_3NH_3In(SO_4)_2 \cdot 12H_2O$	18A-9	161
CH <sub>30</sub> InNO <sub>20</sub> S <sub>2</sub>	$CH_3NH_3In(SO_4)_2 \cdot 12H_2O$	18A-9	161
$C_6K_4MnN_6 \cdot 3H_2O$	$K_4Mn(CN)_6 \cdot 3H_2O$	22A-1	174
C <sub>6</sub> K <sub>4</sub> N <sub>6</sub> Os · 3H <sub>2</sub> O	$K_4Os(CN)_8 \cdot 3H_2O$	22A-4	176
$C_6K_4N_6Ru \cdot 3H_2O$	K <sub>4</sub> Ru(CN) <sub>6</sub> ·3H <sub>2</sub> O	22A-3	176
CaO <sub>3</sub> Ti	CaTiO <sub>3</sub>	1A-5	44
CaO <sub>3</sub> Zr	CaZrO <sub>3</sub>	1A-10	60
Cd <sub>2</sub> H <sub>8</sub> N <sub>2</sub> O <sub>12</sub> S <sub>3</sub>	(NH <sub>4</sub> ) <sub>2</sub> Cd <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	16A-1	156
$Cd_{1/4}Mn_{1/4}Nb_{1/2}O_3Pb$	$\begin{array}{c} \text{Pb}(\text{Cd}_{1/4}\text{Mn}_{1/4}\text{Nb}_{1/2})\text{O}_3 \end{array}$	1B3-xvii	70
	Pb(Cd , Mn , W , )O	1B3-xvii	70
$Cd_{1/4}Mn_{1/4}O_3PbW_{1/2}$	$\begin{array}{c} {\rm Pb}({\rm Cd}_{1/4}{\rm Mn}_{1/4}{\rm W}_{1/2}){\rm O}_3 \\ {\rm Cd}_2{\rm Nb}_2{\rm O}_7 \end{array}$	6A-1	105
Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>			
$Cd_{1/3}Nb_{2/3}O_3Pb$	Pb(Cd <sub>1/3</sub> Nb <sub>2/3</sub> )O <sub>3</sub>	1B4-iii	71
$Cd_{1/2}O_3PbW_{1/2}$	$Pb(Cd_{1/2}W_{1/2})O_3$	1B2-ii	65
CdO <sub>3</sub> Ti	CdTiO <sub>3</sub>	1A-7	50
Cl <sub>3</sub> CsGe	CsGeCl <sub>3</sub>	35–21	208
CIH	HCI	35–11	202
CIK	KCI	35-28	211
$CoCrH_5N_2O_8S_2 \cdot 12H_2O$	$Co(NH_2)_2HCr(SO_4)_2 \cdot 12H_2O$	18A-11	161
$CoCrH_{29}N_2O_{20}S_2$	$Co(NH_2)_2HCr(SO_4)_2 \cdot 12H_2O$	18A-11	161
Colemanite	$Ca_2B_6O_{11} \cdot 5H_2O$ or $CaB_3O_4(OH)_3 \cdot H_2O$	21A-1	173
$Co_{1/4}Mn_{1/4}Nb_{1/2}O_3Pb$	$Pb(Co_{1/4}Mn_{1/4}Nb_{1/2})O_3$	1B3–xvii	70
$Co_{1/4}Mn_{1/4}O_3PbW_{1/2}$	$Pb(Co_{1/4}Mn_{1/4}W_{1/2})O_3$	1B3–xvii	70
$\mathrm{Co_{1/3}Nb_{2/3}O_3Pb}$	$Pb(Co_{1/3}Nb_{2/3})O_3$	1B4iv	71
$\mathrm{Co}_{1/2}\mathrm{Nb}_{1/2}\mathrm{O}_{3}\mathrm{Pb}$	$Pb(Co_{1/2}Nb_{1/2})O_3$	1B3-iv	. 68
$\text{Co}_{1/3}\text{O}_3\text{PbTa}_{2/3}$	$Pb(Co_{1/3}Ta_{2/3})O_3$	1B4-vii	72
$\mathrm{Co}_{1/2}\mathrm{O}_{3}\mathrm{PbTa}_{1/2}$	$Pb(Co_{1/2}Ta_{1/2})O_3$	1B3-xiii	70
$\mathrm{Co}_{1/2}\mathrm{O_3PbW}_{1/2}$	$Pb(Co_{1/2}W_{1/2})O_3$	1B2-iv	66
$Cr_{1/4}Nb_{1/2}O_3PbSc_{1/4}$	$Pb(Sc_{1/4}Cr_{1/4}Nb_{1/2})O_3$	1B3–xvii	70
CsH <sub>2</sub> O <sub>4</sub> P	CsH <sub>2</sub> PO <sub>4</sub>	13A-3	141
CsH <sub>3</sub> O <sub>6</sub> Se <sub>2</sub>	$CsH_3(SeO_3)_2$	20A-3	172
CsNO <sub>3</sub>	CsNO <sub>3</sub>	12A-3	134
Deoxyribonucleic acid	Deoxyribonucleic acid	35–33	212
DNA	Deoxyribonucleic acid	35–33	212
ErMnO <sub>3</sub>	ErMnO <sub>3</sub>	4A-2	95
Eu <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	Eu <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub>	35-2	200
Eu <sub>2</sub> MO <sub>3</sub> O <sub>12</sub>	Eu <sub>2</sub> (MOO <sub>4/3</sub>	33-2	200
$F_7H_8N_2P$	NH <sub>4</sub> PF <sub>6</sub> NH <sub>4</sub> F	35–24	210
FeH <sub>4</sub> NO <sub>8</sub> S <sub>2</sub> · 12H <sub>2</sub> O	$NH_4Fe(SO_4)_2 \cdot 12H_2O$	18A-1	157
$FeH_{28}NO_{20}S_2$	$NH_4Fe(SO_4)_2 \cdot 12H_2O$	18A-1	157
Fe4Nb6Nd6O30	$Nd_6Fe_4Nb_6O_{30}$	5C-i1	104
$Fe_3Nb_7Nd_4O_{30}Pb_2$	Pb <sub>2</sub> Nd <sub>4</sub> Fe <sub>3</sub> Nb <sub>7</sub> O <sub>30</sub>	5C-h3	104
$Fe_{1/2}Nb_{1/2}O_3Pb$	$Pb(Fe_{1/2}Nb_{1/2})O_3$	1B3-iii	67
-,,	Sr <sub>6</sub> FeNb <sub>9</sub> O <sub>30</sub>	5C-f2	104
FeNb <sub>9</sub> O <sub>30</sub> Sr <sub>6</sub>			
$FeNb_9O_{30}Sr_6$ $Fe_2Nb_8O_{30}Sr_4Yb_2$	Sr <sub>4</sub> Yb <sub>2</sub> Fe <sub>2</sub> Nb <sub>3</sub> O <sub>30</sub>	5C-g5	104
$Fe_2Nb_8O_{30}Sr_4Yb_2$	$Sr_4Yb_2Fe_2Nb_8O_{30}$	5C-g5 1B3-xii	104
	Sr <sub>4</sub> Yb <sub>2</sub> Fe <sub>2</sub> Nb <sub>8</sub> O <sub>30</sub> Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub> Pb(Fe <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub>	5C-g5 1B3-xii 1B3-xvi	1

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Gross formula	V Index of substances  Chemical formula			
GASH			Nr.	Pag
Gd <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	$C(NH_2)_3AI(SO_4)_2 \cdot 6H_2O$ $Gd_2(MOO_4)_3$		19A-1	<del></del>
GeTe	GeTe		35-3	1 .0
HI			36-1	200 212
H <sub>11</sub> IN <sub>2</sub> O <sub>6</sub>	HI		1	212
H <sub>4</sub> InNO <sub>8</sub> S <sub>6</sub> · 12H <sub>2</sub> O	(NH <sub>4</sub> ) <sub>2</sub> H <sub>3</sub> IO <sub>6</sub> NH In(SO) 4077		35-13	204
I H <sub>28</sub> InNO <sub>20</sub> S <sub>2</sub>	NH <sub>4</sub> In(SO <sub>4</sub> ) <sub>2</sub> ·12H <sub>2</sub> O NH <sub>4</sub> In(SO <sub>4</sub> ) <sub>2</sub> ·12H <sub>2</sub> O		35-23 18A-3	209
H <sub>2</sub> KO <sub>4</sub> P	KH <sub>2</sub> PO <sub>4</sub>		18A-3	1 150
H <sub>5</sub> LiN <sub>2</sub> O <sub>4</sub> S	Li(N,H,)SO.		13A-1	158 134
H <sub>3</sub> LiO <sub>6</sub> Se <sub>2</sub> H <sub>4</sub> NNaO <sub>4</sub> S · 2H <sub>2</sub> O	$LiH_3(SeO_{\bullet})_{\bullet}$		35-15	205
H <sub>8</sub> NNaO <sub>6</sub> S	NaNHASOA · 2HAO		20A-1	168
H <sub>6</sub> NO <sub>4</sub> P	NaNH <sub>4</sub> SO <sub>4</sub> · 2H <sub>4</sub> O		17A-1	157
H <sub>5</sub> NO <sub>4</sub> S	NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub> (NH <sub>4</sub> )HSO <sub>4</sub>		17A-1	157
H <sub>8</sub> N <sub>2</sub> O <sub>4</sub> S	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	1	13A-7 15A-1	143
H <sub>4</sub> NO <sub>8</sub> S <sub>2</sub> V · 12H <sub>2</sub> O	NH <sub>4</sub> V(SO <sub>4</sub> ) <sub>2</sub> · 12H <sub>2</sub> O	1	14A-1	154
H <sub>28</sub> NO <sub>20</sub> S <sub>2</sub> V	NH <sub>4</sub> V(SO <sub>4</sub> ) <sub>2</sub> ·12H <sub>2</sub> O		18A-2	148 158
H <sub>3</sub> NaO <sub>6</sub> Se <sub>2</sub> H <sub>2</sub> O (Ice)	Nam <sub>3</sub> (SeO <sub>2</sub> ) <sub>2</sub>	1	18A-2	158
H <sub>2</sub> O <sub>4</sub> PRb	$H_2O$		20A-2	169
HO,RbS	RbH <sub>2</sub> PO <sub>4</sub>		35–29	211
HfO <sub>3</sub> Pb	RbHSO, PbHfO,	1	13A-2	141
HoMnO <sub>3</sub>	HoMnO <sub>3</sub>	1	15A-2 1A-14	155
Ho <sub>1/2</sub> Nb <sub>1/2</sub> O <sub>3</sub> Pb	$Pb(Ho_{1/2}Nb_{1/2})O_3$		4A-3	95
Ice			1B3-viii	68
IKO <sub>3</sub>	H <sub>2</sub> O			1 -
ISSb	KIO <sub>3</sub>   SbSI		35-29	211
ISbSe	SbSeI		1A-16 10A-2	64
ISbTe	SbTeI	1	10A-2 10A-4	122
$In_{1/2}Nb_{1/2}O_3Pb$	$Pb(In_{1/2}Nb_{1/2})O_3$		10A-5	125 125
KDP			1B3-vi	68
K <sub>2</sub> LaNb <sub>5</sub> O <sub>15</sub>	KH <sub>2</sub> PO <sub>4</sub>	1	12.4	
K <sub>0.6</sub> Li <sub>0.4</sub> NbO.	$K_2LaNb_5O_{15}$ $K_{0.6}Li_{0.4}NbO_3$		13A-1 5C-a1	134
Ko Lio Nb O Ta	K <sub>0.6</sub> Li <sub>0.4</sub> (Ta <sub>0.7</sub> Nb <sub>0.3</sub> )O <sub>3</sub>		5C-k1	102
KLiO <sub>4</sub> S KNO <sub>2</sub>	KLISU,		5C-k2	105
KNO <sub>2</sub>	KNO.		35-27	211
KNbO <sub>3</sub>	KNO <sub>3</sub>		11A-2	130
KNb <sub>5</sub> O <sub>15</sub> Sr <sub>2</sub>	KNbO <sub>3</sub>		12A-1	131
KO <sub>3</sub> Ta	KSr <sub>2</sub> NĎ <sub>5</sub> O <sub>15</sub> KTaO <sub>3</sub>		1A-2 5C-b1	39
Logontia			1A-4	102
Lecontite LiNbO <sub>3</sub>	NaNH <sub>4</sub> SO <sub>4</sub> · 2H <sub>2</sub> O			41
Li <sub>1/4</sub> Nb <sub>1/4</sub> O <sub>3</sub> PbW <sub>1/2</sub>	LiNbO.	1	17A-1	157
LIU, Ia	Pb(Li <sub>1/4</sub> Nb <sub>1/4</sub> W <sub>1/2</sub> )O <sub>3</sub>		3A-1	89
LuMnO <sub>3</sub>	LiTaO <sub>3</sub> LuMnO <sub>3</sub>		1B3-xvii 3A-2	70
Lu <sub>1/2</sub> Nb <sub>1/2</sub> O.Pb	Pb(Lu <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>		3A-2 4A-6	92
Lu <sub>1/2</sub> O <sub>3</sub> PbTa <sub>1/2</sub>	Pb(Lu <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub>	- 1	1B3-ix	97 68
MASD	1		1B3-xv	70
Mg <sub>1/4</sub> Mn <sub>1/4</sub> Nb <sub>1/2</sub> O <sub>3</sub> Pb	CH <sub>3</sub> NH <sub>3</sub> Al(SO <sub>4</sub> ) <sub>2</sub> ·12H <sub>2</sub> O			
$Mg_{1/4}Mn_{1/4}O_{\bullet}PbTa_{1/4}$	1 2 (Mg1/4MH1/4ND-/-)()		18A-4	158
Mg <sub>1/4</sub> Mn <sub>1/4</sub> O <sub>2</sub> PbW <sub>1/4</sub>	1 1 D(Mg/MIn/, 1a./.)O		B3–xvii B3–xvii	70
$^{M}$ g <sub>1/3</sub> $^{M}$ D <sub>9/9</sub> O <sub>9</sub> Pb	$Pb(Mg_{1/4}Mn_{1/4}W_{1/2})O_3$ $Pb(Mg_{1/3}Nb_{2/3})O_3$	i	B3-xvii	70
$MgNb_{14}O_{45}Sr_{9}$	Sr <sub>a</sub> MgNbO	1	B4-i	70 70
$Mg_{1/3}O_{3}PbTa_{2/3}$ $Mg_{1/2}O_{3}PbW_{1/2}$	$PD(Mg_{1/2}Ta_{0/2})O_{2}$	5	C-e2	104
Mn <sub>1/4</sub> Nb <sub>1/2</sub> Ni <sub>1/4</sub> O <sub>3</sub> Pb	$10(Mg_{1/2}W_{1/2})O_{2}$	1	B4-vi	72
$vin_{1/2}Nb_{1/2}O_{\bullet}Pb$	FO(N1,/4Mn,/4Nb,/5)O		B2-i	65
$VIn_{1/4}Nb_{1/2}O_{\bullet}PbZn_{-1}$	$ID(MII_{1/2}ND_{1/2})O_{2}$		B3-xvii B3-ii	70
Mn <sub>1/4</sub> Ni <sub>1/4</sub> O <sub>8</sub> PbW <sub>1/2</sub>	$Pb(Zn_{1/4}Mn_{1/4}Nb_{1/2})O_3$ $Pb(Ni_{1/4}Mn_{1/4}W_{1/2})O_3$	11	B3-11 B3-xvii	67
	· 1/41/4 ** 1/2/V <sub>8</sub>	1 11	B3-xvii	70 70
	Furuhata/Makita			
	- Grunata/iviakita			575

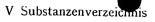
#### V Substanzenverzeichnis

MnO <sub>2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbRe <sub>1/2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbRe <sub>1/2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbTa <sub>1/2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbW <sub>1/2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbW <sub>1/2</sub> MnO <sub>3</sub> Tm MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb Nb <sub>2/3</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	MnO <sub>2</sub> Pb(Mn <sub>1/2</sub> Re <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>2/3</sub> W <sub>1/3</sub> )O <sub>3</sub> TmMnO <sub>3</sub> YMnO <sub>3</sub> YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	35-31 1B2-v 1B3-xi 1B2-iii 1B5-i 4A-4 4A-1 4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	212 66 69 66 73 96 94 96 200 201 128 133 37 40
Mn <sub>1/2</sub> O <sub>3</sub> PbTa <sub>1/2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbW <sub>1/2</sub> Mn <sub>2/3</sub> O <sub>3</sub> PbW <sub>1/3</sub> MnO <sub>3</sub> Tm MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Pb(Mn <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>2/3</sub> W <sub>1/3</sub> )O <sub>3</sub> TmMnO <sub>3</sub> YMnO <sub>3</sub> YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1B3-xi 1B2-iii 1B5-i 4A-4 4A-1 4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	69 66 73 96 94 96 200 201 128 133 37
Mn <sub>1/2</sub> O <sub>3</sub> PbTa <sub>1/2</sub> Mn <sub>1/2</sub> O <sub>3</sub> PbW <sub>1/2</sub> Mn <sub>2/3</sub> O <sub>3</sub> PbW <sub>1/3</sub> MnO <sub>3</sub> Tm MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Pb(Mn <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> Pb(Mn <sub>2/3</sub> W <sub>1/3</sub> )O <sub>3</sub> TmMnO <sub>3</sub> YMnO <sub>3</sub> YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1B2-iii 1B5-i 4A-4 4A-1 4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	66 73 96 94 96 200 201 128 133 37
Mn <sub>1/2</sub> O <sub>3</sub> PbW <sub>1/2</sub> Mn <sub>2/3</sub> O <sub>3</sub> PbW <sub>1/3</sub> MnO <sub>3</sub> Tm MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Pb(Mn <sub>2/3</sub> W <sub>1/3</sub> )O <sub>3</sub> TmMnO <sub>3</sub> YMnO <sub>3</sub> YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaYO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1B5-i 4A-4 4A-1 4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	73 96 94 96 200 201 128 133 37
Mn <sub>2/3</sub> O <sub>3</sub> PbW <sub>1/3</sub> MnO <sub>3</sub> Tm MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Pb(Mn <sub>2/3</sub> W <sub>1/3</sub> )O <sub>3</sub> TmMnO <sub>3</sub> YMnO <sub>3</sub> YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaYO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	4A-4 4A-1 4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	96 94 96 200 201 128 133 37
MnO <sub>3</sub> Tm MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	TmMnO <sub>3</sub> YMnO <sub>3</sub> YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	4A-1 4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	94 96 200 201 128 133 37
MnO <sub>3</sub> Y MnO <sub>3</sub> Yb Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	YbMnO <sub>3</sub> Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	4A-5 35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	96 200 201 128 133 37
$MnO_3Yb$ $Mo_3O_{12}Sm_2$ $Mo_3O_{12}Tb_2$ $NNaO_2$ $NO_3Rb$ $NaNbO_3$ $NaO_3Ta$ $NaO_3V$ $Nb_{1/2}Ni_{1/2}O_3Pb$	Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	35-1 35-4 11A-1 12A-2 1A-1 1A-3 35-19	200 201 128 133 37
Mo <sub>3</sub> O <sub>12</sub> Sm <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Sm <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	35-4 11A-1 12A-2 1A-1 1A-3 35-19	201 128 133 37
Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub> NNaO <sub>2</sub> NO <sub>3</sub> Rb NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Tb <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub> NaNO <sub>2</sub> RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	35-4 11A-1 12A-2 1A-1 1A-3 35-19	128 133 37
NO <sub>3</sub> RĎ NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	12A-2 1A-1 1A-3 35-19	133 37
NO <sub>3</sub> RĎ NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	RbNO <sub>3</sub> NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	12A-2 1A-1 1A-3 35-19	37
NaNbO <sub>3</sub> NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	NaNbO <sub>3</sub> NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1A-1 1A-3 35-19	37
NaO <sub>3</sub> Ta NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	NaTaO <sub>3</sub> NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1A-3 35-19	
NaO <sub>3</sub> V Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	NaVO <sub>3</sub> Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	35–19	
Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb	Pb(Ni <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>		208
Nb <sub>1/2</sub> Ni <sub>1/2</sub> O <sub>3</sub> Pb Nb <sub>0/2</sub> Ni <sub>1/2</sub> O <sub>2</sub> Pb		1 1 14 4 - 17	68
NDa/aN1,/aOaPb		1B3-v	
	$Pb(Ni_{1/3}Nb_{2/3})O_3$	1B4-v	72
$Nb_2O_6Pb$	PbNb <sub>2</sub> O <sub>6</sub>	5A-1	97
$Nb_2O_7Pb_2$	Pb <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	6A-2	106
$Nb_{1/2}O_3PbSc_{1/2}$	$Pb(Sc_{1/2}Nb_{1/2})O_3$	1B3-i	67
$Nb_{1/2}O_3PbYb_{1/2}$	$Pb(Yb_{1/2}Nb_{1/2})O_3$	1B3-vii	68
$Nb_{2/3}O_3PbZn_{1/3}$	$Pb(Zn_{1/3}Nb_{2/3})O_3$	1B4–ii	71
Nb <sub>5</sub> O <sub>15</sub> RbSr <sub>2</sub>	RbSr <sub>2</sub> Nb <sub>5</sub> O <sub>15</sub>	5C-b4	103
Ni <sub>1/3</sub> O <sub>3</sub> PbTa <sub>2/3</sub>	Pb(Ni <sub>1/3</sub> Ta <sub>2/3</sub> )O <sub>3</sub>	1B4-viii	73
O <sub>3</sub> PbSc <sub>1/2</sub> Ta <sub>1/2</sub>	$Pb(Sc_{1/2}Ta_{1/2})O_3$	1B3-x	69
O <sub>6</sub> Pb <sub>4</sub> Si	Pb <sub>4</sub> SiO <sub>6</sub>	35–26	210
O <sub>6</sub> PbTa <sub>2</sub>	PbTa <sub>2</sub> O <sub>6</sub>	5A-4	98
$O_3PbTa_{1/2}Yb_{1/2}$	Pb(Yb <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub>	1B3-xiv	70
$O_3$ PbTi	PbTiO <sub>3</sub>	1A-9	59
$O_8Pb_3V_2$	Pb <sub>3</sub> V <sub>2</sub> O <sub>8</sub>	35-25	210
$O_3PbZr$	PbZrO <sub>3</sub>	1A-13	61
	RbTaO <sub>3</sub>	35–17	207
O <sub>3</sub> RbTa	SnO <sub>2</sub>	35–32	212
O <sub>2</sub> Sn	SHO <sub>2</sub>	5A-2	98
O <sub>6</sub> SrTa <sub>2</sub>	SrTa <sub>2</sub> O <sub>6</sub>	6A-3	100
O <sub>7</sub> Sr <sub>2</sub> Ta <sub>2</sub>	Sr <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub>		
O <sub>3</sub> SrTi	SrTiO <sub>3</sub>	1A-6	45
O <sub>s</sub> SrZr	SrZrO <sub>3</sub>	1A-11	61
$O_2Ti$	TiO <sub>2</sub>	35–30	212
$O_3W$	WO3	2A-1	88
p-azoxyanisole	C <sub>14</sub> H <sub>14</sub> N <sub>2</sub> O <sub>3</sub>	37–1	215
p-azoxyphenetole	$C_{16}H_{18}N_2O_3$	37–2	21
p-butoxybenzoic acid	$C_{11}H_{14}O_3$	37-3	215
Perovskite	CaTiO <sub>3</sub>	1A-5	44
p-methoxycinnamic acid	$C_{10}H_{10}O_3$	37-4	210
Pyrolusite	MnO <sub>2</sub>	35–31	212
Rochelle salt	NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O	33A-1	193
RS	NaKC, HO · 4H2O	33A-1	193
Rutile	TiO <sub>2</sub>	35–30	212
Seignette salt	NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	33A-1	193
SiV,	V <sub>3</sub> Si	36-4	214
SnTe	SnTe	36–2	213
TGS	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> H <sub>2</sub> SO <sub>4</sub>	28A-1	18
Tri-glycine tellurate	(11112011200011)3112004	28A-4	19

Gross formula	(1)			
	Chemical formula		Nr.	Pa
ABO <sub>3</sub> Al <sub>2</sub> BaO <sub>4</sub>	ABO <sub>3</sub> -PbTiO <sub>3</sub> -PbZrO <sub>3</sub>		10.00	+
AlLaO <sub>3</sub>	BaAl <sub>2</sub> O <sub>4</sub> -BaLi <sub>2</sub> F.		1C-f9	
AlLaO <sub>3</sub>	LaAlO,-BaTiO,		8B-1	1
AlLaO,	LaAlO <sub>3</sub> -BiFeO <sub>3</sub>		1C-c8	
AsH <sub>6</sub> NO <sub>4</sub>	LaAlO <sub>3</sub> -PbTiO <sub>3</sub>		1C-b11	
AsH <sub>2</sub> O <sub>4</sub> TI	NH <sub>4</sub> H <sub>2</sub> AsO <sub>4</sub> -TlH <sub>2</sub> AsO <sub>4</sub>		1C-c10	1 3
AsIS	TlH <sub>2</sub> AsO <sub>4</sub> -NH <sub>4</sub> H <sub>2</sub> AsO <sub>4</sub>		13B-3 13B-3	1.
	AsSI-SbSI		10B-1	1 1:
BaBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>	(Ba-Pb)Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>		1	1
BaBi, Nb,O,	Bi <sub>2</sub> BaNb <sub>2</sub> O <sub>2</sub> -Bi <sub>2</sub> TiNbO		7B5	11
BaBi <sub>3</sub> NbO <sub>12</sub> Ti <sub>2</sub>	Bi <sub>3</sub> BaTi <sub>2</sub> NbO <sub>10</sub> -Bi <sub>4</sub> Ti <sub>2</sub> O <sub>11</sub>		7B-1	11
BaF, Li,	Dall <sub>2</sub> F <sub>4</sub> -BaAl <sub>2</sub> O <sub>4</sub>		7B-2	11
$BaFe_{1/2}O_3Ta_{1/2}$ $BaHfO_3$	$\mathrm{Ba}(\mathrm{Fe_{1/2}Ta_{1/2}})\mathrm{O_3}\mathrm{-BaTiO_3}$		8B-1	11
BaHfO <sub>3</sub>	BaHtO,-BaTiO		1C-d2	8
BaNb <sub>2</sub> O <sub>6</sub>	BaHfO <sub>3</sub> -PbHfO <sub>3</sub>		1C-a24	7
BaNb <sub>2</sub> O <sub>6</sub>	BaNb <sub>2</sub> O <sub>6</sub> -BaTiO <sub>6</sub>	j	1C-a18	7
BaNb <sub>2</sub> O <sub>6</sub>	BaNb <sub>2</sub> O <sub>6</sub> -BaZrO <sub>3</sub>		1C-e9	8
BaNb <sub>2</sub> O <sub>6</sub>	BaNb <sub>2</sub> O <sub>6</sub> -CaNb <sub>2</sub> O <sub>6</sub>	- 1	5C-j2	10
BaNb <sub>2</sub> O <sub>6</sub>	BaNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>		5B-1	9
BaNb <sub>2</sub> O <sub>6</sub>	BaNb <sub>2</sub> O <sub>6</sub> -SrNb <sub>2</sub> O <sub>6</sub>	1	5B-5 5B-3	10
BaNb <sub>2</sub> O <sub>6</sub>	BaNb <sub>2</sub> O <sub>6</sub> -BaTiO <sub>3</sub> -PbTiO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>	1	1C-f19	9
BaNb <sub>2</sub> O <sub>6</sub>	(Da-FD-SI(ND-1a) ()	j	5B-15	81
$BaNb_2O_6$	(Ba-Pb-Ca)(Nb-Ta) <sub>2</sub> O <sub>6</sub>	- 1	5B-15	102
BaO <sub>3</sub> Sn	BaZr <sub>0.25</sub> Nb <sub>1.5</sub> O <sub>5.25</sub> BaSnO <sub>3</sub> -BaTiO <sub>3</sub>	.	5C-j3	105
BaO <sub>3</sub> Sn	BaSnO <sub>3</sub> -PbO: SnO <sub>2</sub>		1C-a25	77
BaO <sub>3</sub> Sn	BaSnO <sub>3</sub> -PbTiO <sub>3</sub>		1C-a21	76
BaO <sub>3</sub> Sn	(Ba-Pb)(Sn-Ti)O <sub>3</sub>	i	1C-b10	83
BaO <sub>3</sub> Sn	BaSnO <sub>3</sub> -SrSnO <sub>3</sub>	.	1C-f18	88
BaO <sub>3</sub> Sn	BaSnO <sub>3</sub> -CaSnO <sub>3</sub> -SrSnO <sub>3</sub>	1	1C-a20	76
BaO <sub>6</sub> Ta <sub>2</sub>	BaTa <sub>2</sub> O <sub>6</sub> -BaTiO <sub>6</sub>		1C-f13	88
BaO, Ta,	$(Ba-Pb-Ca)(Ta-Nb)_{a}O$	1	1C-e10	87
BaO <sub>6</sub> Ta <sub>2</sub> BaO <sub>8</sub> Ti	(Ba-Pb-Sr)(Ta-Nb)	i i	5B-15	102
BaO₃Ti	$BaTiO_3-Ba(Fe_{1/2}Ta_{1/2})O$		5B-15	102
BaO₃Ti	DaliO <sub>3</sub> -BaHfO <sub>6</sub>		1C-d2	84
BaO₃Ti	BaTiO <sub>3</sub> -BaNb <sub>2</sub> O <sub>6</sub>		1C-a24	77
BaO <sub>s</sub> Ti	BaTiO <sub>3</sub> -BaSnO <sub>3</sub>		1C-e9 1C-a25	86
BaO <sub>s</sub> Ti	BaTiO <sub>3</sub> -BaTa <sub>2</sub> O <sub>6</sub>	1	1C-e10	77
BaO <sub>s</sub> Ti	BaTiO <sub>3</sub> -BaUO <sub>3</sub>		1C-a26	87
BaO,Ti	BaTiO <sub>3</sub> -BaZrO <sub>3</sub> BaTiO <sub>3</sub> -BiFeO <sub>3</sub>		1C-a23	77 77
8aO₃Ti	BaTiO <sub>3</sub> -Bi <sub>4</sub> Ti <sub>5</sub> O <sub>12</sub>		1C-c9	77 84
SaO <sub>3</sub> Ti	BaTiO <sub>3</sub> -CaTiO <sub>3</sub>	- 1	7B-6	114
aO <sub>3</sub> Ti	BaTiO <sub>3</sub> -Co <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>		1C-a7	74
aO <sub>3</sub> Ti	BaTiO <sub>3</sub> -Co <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub>		1C-e11	87
aO <sub>3</sub> Ti	BaTiO <sub>3</sub> -(K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO	1	1C-e11	87
aO <sub>3</sub> Ti	BaliO <sub>3</sub> -KNbO <sub>6</sub>		1C-d3	84
aO <sub>3</sub> Ti	BaTiO <sub>3</sub> -LaAlO <sub>3</sub>		1C-c5	83
aO <sub>s</sub> Ti	BaTiO <sub>3</sub> -Mn <sub>0</sub> Nb <sub>0</sub> O <sub>2</sub>		1C-c8	83
aO <sub>3</sub> Ti aO <sub>3</sub> Ti	BaTiO,-MnoTaoO		1C-e11	87
aO <sub>3</sub> Ti aO <sub>3</sub> Ti	BaTiO,-NaNbO.		1C-e11	87
aO₃11 aO₃Ti	BallO <sub>3</sub> -Ni <sub>2</sub> Nb <sub>2</sub> O <sub>3</sub>		1C-c2	83
aO <sub>3</sub> Ti	BaTiO <sub>3</sub> -Ni <sub>3</sub> Ta <sub>3</sub> O <sub>3</sub>		1C-e11	87
aO <sub>s</sub> Ti	$BaTiO_3-PbO:SnO_3$		1C-e11	87
10,11 10,Ti	BaTiO,-PbTiO.		1C-b4	82
ιΟ <sub>3</sub> Τί	BaTiO <sub>3</sub> -PbZrO <sub>3</sub>	1	1C-a11	75
ıO₃Ti	BaTiO <sub>3</sub> -SrTiO <sub>3</sub>		1C-b3	82
O <sub>3</sub> Ti	BaTiO <sub>3</sub> -CaTiO <sub>3</sub> -PbTiO <sub>3</sub> BaTiO <sub>3</sub> -CaTiO <sub>3</sub> -SrTiO <sub>3</sub>	-	1C-a9 1C-f2	75
•	← DallO.=Call() _SrTiO	1	10-14	87

Gross formula	Chemical formula	Nr.	Page
BaO <sub>3</sub> Ti	BaTiO <sub>3</sub> -LaInO <sub>3</sub> -LaYO <sub>3</sub> -SrTiO <sub>3</sub>	1C-f12	88
BaO <sub>3</sub> Ti	BaTiO <sub>3</sub> -PbTiO <sub>3</sub> -BaNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	1C-f19	88
BaO <sub>3</sub> Ti	(Ba-Ca)(Ti-Zr)O <sub>3</sub>	1C-f15	88
BaO <sub>3</sub> Ti	(Ba-Pb)(Ti-Sn)O <sub>3</sub>	1C-f18	88
BaO <sub>3</sub> Ti	(Ba-Pb)(Ti-Zr)O <sub>3</sub>	1C-f17	88
BaO <sub>3</sub> U	BaUO <sub>3</sub> -BaTiO <sub>3</sub>	1C-a26	77
BaO <sub>3</sub> Zr	BaZrO <sub>3</sub> -BaNb <sub>2</sub> O <sub>6</sub>	5C-j2	105
BaO <sub>3</sub> Zr	BaZrO <sub>3</sub> -BaTiO <sub>3</sub>	1C-a23	77 76
BaO <sub>3</sub> Zr	BaZrO <sub>3</sub> -CaZrO <sub>3</sub>	1C-a12	76 82
BaO <sub>3</sub> Zr	BaZrO <sub>3</sub> -PbTiO <sub>3</sub>	1C-b9	76
BaO <sub>3</sub> Zr	BaZrO <sub>3</sub> -PbZrO <sub>3</sub>	1C-a15 1C-f15	88
BaO <sub>3</sub> Zr	(Ba-Ca)(Zr-Ti)O <sub>3</sub> (Ba-Pb)(Zr-Ti)O <sub>3</sub>	1C-f17	88
BaO <sub>3</sub> Zr		5C-j3	105
BaO <sub>3</sub> Zr	BaZr <sub>0.25</sub> Nb <sub>1.5</sub> O <sub>5.25</sub>	14B-1	154
BeF <sub>4</sub> H <sub>8</sub> N <sub>2</sub>	$(NH_4)_2BeF_4-(NH_4)_2SO_4$ BiFeO <sub>3</sub> -BaTiO <sub>3</sub>	1C-c9	84
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -LaAlO <sub>3</sub>	1C-b11	83
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -LaCrO <sub>3</sub>	1C-b12	83
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -LaFeO <sub>3</sub>	1C-a33	82
BiFeO <sub>3</sub> BiFeO <sub>3</sub>	$BiFeO_3-EareO_3$ $BiFeO_3-Pb(Fe_{1/2}Nb_{1/2})O_3$	1C-d23	85
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -PbTiO <sub>3</sub>	1C-c13	84
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -PbZrO <sub>3</sub>	1C-c14	84
BiFeO,	BiFeO <sub>3</sub> -SrFeO <sub>3</sub>	1C-c16	84 `
BiFeO <sub>3</sub>	$BiFeO_3-Sr(Sn_{1/3}Mn_{2/3})O_3$	1C-d22	85
BiFeO,	BiFeO <sub>3</sub> -SrSnO <sub>3</sub>	1C-c15	84
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -SrTiO <sub>3</sub>	1C-c7	83 `
BiFeO <sub>3</sub>	BiFeO <sub>3</sub> -PbTiO <sub>3</sub> -PbZrO <sub>3</sub>	1Cf6	87
Bi <sub>5</sub> GaO <sub>15</sub> Ti <sub>3</sub>	Bi <sub>5</sub> Ti <sub>3</sub> GaO <sub>15</sub> -Bi <sub>4</sub> PbTi <sub>4</sub> O <sub>15</sub>	7B–7	114
BiIS	BiSI-SbSI	10B-5	128
Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti	(K <sub>1/2</sub> Bi <sub>1/2</sub> )TiO <sub>3</sub> -BaTiO <sub>3</sub>	1C-d3	84
Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti	$(K_{1/2}Bi_{1/2})TiO_3-(Na_{1/2}Bi_{1/2})TiO_3$	1Cd20	85
Bi <sub>1/2</sub> K <sub>1/2</sub> O <sub>3</sub> Ti	$(K_{1/2}Bi_{1/2})TiO_3-PbTiO_3$	1C-d5	84
$Bi_{1/2}K_{1/2}O_3Zr$	$(K_{1/2}Bi_{1/2})ZrO_3-PbZrO_3$	1C-d17	85
$Bi_{1/2}Na_{1/2}O_3Ti$	$(Na_{1/2}Bi_{1/2})TiO_3 - (K_{1/2}Bi_{1/2})TiO_3$	1C-d20	85
$Bi_{1/2}Na_{1/2}O_3Ti$	$(Na_{1/2}Bi_{1/2})TiO_3-PbTiO_3$	1C-d4	84
$Bi_{1/2}Na_{1/2}O_3Ti$	$(Na_{1/2}Bi_{1/2})TiO_3-PbZrO_3$	1C-d21	85
$Bi_{1/2}Na_{1/2}O_3Zr$	$(Na_{1/2}Bi_{1/2})ZrO_3-PbZrO_3$	1C-d16	85
BiNbO <sub>6</sub>	Bi(Nb-Ti)O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-14	102
$\mathrm{Bi_2Nb_6O_{18}}$	Bi <sub>2</sub> O <sub>3</sub> · 3Nb <sub>2</sub> O <sub>5</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-13	102
Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb	Bi <sub>2</sub> PbNb <sub>2</sub> O <sub>9</sub> -Bi <sub>3</sub> TiNbO <sub>9</sub>	7B-1	113
Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Pb	Bi <sub>2</sub> PbNb <sub>2</sub> O <sub>9</sub> -BaBi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub>	7B-5 7B-2	114 113
Bi <sub>3</sub> NbO <sub>12</sub> PbTi <sub>2</sub>	Bi <sub>3</sub> PbTi <sub>2</sub> NbO <sub>12</sub> -Bi <sub>4</sub> Ti <sub>3</sub> O <sub>12</sub>	7B-2 7B-1	113
Bi <sub>2</sub> Nb <sub>2</sub> O <sub>9</sub> Sr	Bi <sub>2</sub> SrNb <sub>2</sub> O <sub>9</sub> -Bi <sub>3</sub> TiNbO <sub>9</sub>	7B-1 7B-2	113
Bi <sub>3</sub> NbO <sub>12</sub> SrTi <sub>2</sub>	Bi <sub>3</sub> SrTi <sub>2</sub> NbO <sub>12</sub> -Bi <sub>4</sub> Ti <sub>3</sub> O <sub>12</sub> Bi TiNbO Bi BoNb O	7B-2 7B-1	113
Bi <sub>3</sub> NbO <sub>9</sub> Ti	Bi <sub>2</sub> TiNbO <sub>9</sub> -Bi <sub>2</sub> BaNb <sub>2</sub> O <sub>9</sub>   Bi <sub>3</sub> TiNbO <sub>9</sub> -Bi <sub>2</sub> PbNb <sub>2</sub> O <sub>9</sub>	7B-1	113
Bi <sub>8</sub> NbO <sub>9</sub> Ti	Bi <sub>3</sub> TiNbO <sub>9</sub> -Bi <sub>2</sub> TiNb <sub>2</sub> O <sub>9</sub> Bi <sub>3</sub> TiNbO <sub>9</sub> -Bi <sub>2</sub> SrNb <sub>2</sub> O <sub>9</sub>	7B-1	113
Bi <sub>3</sub> NbO <sub>3</sub> Ti	Bi <sub>4</sub> PbTi <sub>4</sub> O <sub>15</sub> -Bi <sub>5</sub> Ti <sub>3</sub> GaO <sub>15</sub>	7B-7	114
Bi <sub>4</sub> O <sub>15</sub> PbTi <sub>4</sub>	Bi(Ti-Nb)O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-14	102
BiO <sub>6</sub> Ti Bi <sub>2</sub> O <sub>9</sub> Ti <sub>3</sub>	Bi <sub>2</sub> O <sub>3</sub> · 3TiO <sub>2</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-14	102
Bi <sub>2</sub> O <sub>9</sub> Ti <sub>3</sub>	Bi <sub>2</sub> O <sub>3</sub> · 3TiO <sub>2</sub> - SrTiO <sub>3</sub>	1C-e8	86
Bi <sub>2</sub> O <sub>3</sub> Ti <sub>3</sub> Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>	Bi <sub>4</sub> Ti <sub>5</sub> O <sub>12</sub> -BaTiO <sub>3</sub>	7B-6	114
Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>	Bi <sub>4</sub> Ti <sub>3</sub> O <sub>12</sub> -Bi <sub>3</sub> BaTi <sub>2</sub> NbO <sub>12</sub>	7B-2	113
Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>	Bi <sub>4</sub> Ti <sub>3</sub> O <sub>12</sub> -Bi <sub>3</sub> PbTi <sub>2</sub> NbO <sub>12</sub>	7B-2	113
Bi <sub>4</sub> O <sub>12</sub> Ti <sub>3</sub>	Bi <sub>4</sub> Ti <sub>3</sub> O <sub>12</sub> -Bi <sub>3</sub> SrTi <sub>2</sub> NbO <sub>12</sub>	7B-2	113
BrSSb	SbSBr-SbSI	10B-3	127
$C_6FH_{17}N_3O_9P$	(NH <sub>3</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·H <sub>2</sub> PO <sub>3</sub> F-	2012 2	101
	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·H <sub>2</sub> SO <sub>4</sub>	28B-2	191
$C_6FeH_6K_4N_6O_3$	$K_4Fe(CN)_6 \cdot 3H_2O - (NH_4)_4Fe(CN)_6 \cdot 3H_2O$	22B-1	176
C <sub>6</sub> FeH <sub>6</sub> K <sub>4</sub> N <sub>6</sub> O <sub>3</sub>	$K_4Fe(CN)_6 \cdot 3H_2O - Rb_4Fe(CN)_6 \cdot 3H_2O$	22B-2 22B-3	176 177
C <sub>6</sub> FeH <sub>6</sub> K <sub>4</sub> N <sub>6</sub> O <sub>3</sub>	$K_4$ Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O-Tl <sub>4</sub> Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O	22B-3 22B-1	176
$C_6FeH_{16}N_{10} \cdot 3H_2O$	$(NH_4)_4$ Fe(CN) <sub>6</sub> · $3H_2O$ – $K_4$ Fe(CN) <sub>6</sub> · $3H_2O$	22B-1 22B-1	176
$C_6$ Fe $H_{22}N_{10}O_3$	$(NH_4)_4$ Fe(CN) <sub>6</sub> · $3H_2$ O- $K_4$ Fe(CN) <sub>6</sub> · $3H_2$ O		1,0

		1 37 I	D
Gross formula	Chemical formula	Nr.	Page
C <sub>6</sub> FeH <sub>6</sub> N <sub>6</sub> O <sub>3</sub> Rb <sub>4</sub>	$Rb_4Fe(CN)_6 \cdot 3H_2O - K_4Fe(CN)_6 \cdot 3H_2O$	22B-2	176
C <sub>6</sub> FeH <sub>6</sub> N <sub>6</sub> O <sub>3</sub> Tl <sub>4</sub>	$Tl_4Fe(CN)_6 \cdot 3H_2O - K_4Fe(CN)_6 \cdot 3H_2O$	22B-3	177
	$K_4$ Fe(CN) <sub>6</sub> · $3H_2$ O-(NH <sub>4</sub> ) <sub>4</sub> Fe(CN) <sub>6</sub> · $3H_2$ O	22B-1	176
C <sub>6</sub> FeK <sub>4</sub> N <sub>6</sub> ·3H <sub>2</sub> O	$K_4$ Fe(CN) <sub>6</sub> · $3H_2$ O-Rb <sub>4</sub> Fe(CN) <sub>6</sub> · $3H_2$ O	22B-2	176
C <sub>6</sub> FeK <sub>4</sub> N <sub>6</sub> · 3H <sub>2</sub> O	$K_4$ Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O-Tl <sub>4</sub> Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O	22B-3	177
C <sub>6</sub> FeK <sub>4</sub> N <sub>6</sub> · 3H <sub>2</sub> O	$Rb_4Fe(CN)_6 \cdot 3H_2O - K_4Fe(CN)_6 \cdot 3H_2O$	22B-2	176
C <sub>6</sub> FeN <sub>6</sub> Rb <sub>4</sub> ·3H <sub>2</sub> O	The (CN) 311 O K Ea(CN) 311 O	22B-3	177
$C_6 \text{FeN}_6 \text{Tl}_4 \cdot 3\text{H}_2 \text{O}$	Tl <sub>4</sub> Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O-K <sub>4</sub> Fe(CN) <sub>6</sub> · 3H <sub>2</sub> O	33B-1	198
$C_4H_4KNaO_6 \cdot 4H_2O$	NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O-NaNH <sub>4</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	33B-2	198
$C_4H_4KNaO_6 \cdot 4H_2O$	NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O-NaTlC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O		198
C <sub>4</sub> H <sub>12</sub> KNaO <sub>10</sub>	NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O-NaNH <sub>4</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O	33B-1	
C <sub>4</sub> H <sub>12</sub> KNaO <sub>10</sub>	$NaKC_4H_4O_6 \cdot 4H_2O-NaTlC_4H_4O_6 \cdot 4H_2O$	33B-2	198
C <sub>4</sub> H <sub>8</sub> NN <sub>2</sub> O <sub>6</sub> 4H <sub>2</sub> O	NaNH <sub>4</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O-NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	33B-1	198
C4H16NNaO10	NaNH, C, H, O, · 4H, O-NaKC, H, O, · 4H, O	33B-1	198
C <sub>6</sub> H <sub>17</sub> N <sub>3</sub> O <sub>10</sub> S	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·H <sub>2</sub> SO <sub>4</sub> -(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·		Į
O61117113O10S	· H.PO.F	28B-2	191
C <sub>0</sub> H <sub>17</sub> N <sub>3</sub> O <sub>10</sub> S	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·H <sub>2</sub> SO <sub>4</sub> -(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·	200 1	101
	· H <sub>2</sub> SeO <sub>4</sub>	28B-1	191
$C_6H_{17}N_3O_{10}Se$	(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·H <sub>2</sub> SeO <sub>4</sub> -(NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> ·	28B-1	191
	· H <sub>2</sub> SO <sub>4</sub>	33B-2	198
$C_4H_4NaO_6Tl \cdot 4H_2O$	NaTIC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O-NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O	33B-2	198
$C_4H_{12}NaO_{10}Tl$	NaTIC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O-NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> · 4H <sub>2</sub> O	1C-a16	76
CaHfO <sub>3</sub>	CaHfO <sub>3</sub> -PbHfO <sub>3</sub>	•	99
CaNb <sub>2</sub> O <sub>6</sub>	$CaNb_2O_6$ - $BaNb_2O_6$	5B-1	1
CaNb <sub>2</sub> O <sub>6</sub>	CaNb <sub>2</sub> O <sub>6</sub> -NaNbO <sub>3</sub>	1C-e3	86
CaNb <sub>2</sub> O <sub>6</sub>	CaNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-2	99
CaNb <sub>2</sub> O <sub>6</sub>	(Ca-Ba-Pb)(Nb-Ta) <sub>2</sub> O <sub>6</sub>	5B-15	102
Ca <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	Ca <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	6B-1	106
	CaSnO <sub>3</sub> -PbTiO <sub>3</sub>	1C-b6	82
CaO <sub>3</sub> Sn		1C-a19	76
CaO <sub>3</sub> Sn	CaSnO <sub>3</sub> -SrSnO <sub>3</sub>	1C-f13	88
CaO <sub>3</sub> Sn	CaSnO <sub>3</sub> -SrSnO <sub>3</sub> -BaSnO <sub>3</sub>	5B-15	102
CaO <sub>6</sub> Ta <sub>2</sub>	$(Ca-Ba-Pb)(Ta-Nb)_2O_6$	6B-6	106
Ca <sub>2</sub> O <sub>7</sub> Ta <sub>2</sub>	$Ca_2Ta_2O_7-Sr_2Ta_2O_7$	1	
CaO <sub>3</sub> 1i	CaTiO <sub>3</sub> -BaTiO <sub>3</sub>	1C-a7	74
CaO <sub>3</sub> Ti	CaTiO <sub>3</sub> CaZrO <sub>3</sub>	1C-a22	76
CaO <sub>3</sub> Ti	CaTiO <sub>3</sub> -NaNbO <sub>3</sub>	1C-c1	83
CaO <sub>3</sub> Ti	CaTiO <sub>3</sub> -PbTiO <sub>3</sub>	1C-a8	75
CaO <sub>3</sub> Ti	CaTiO <sub>3</sub> -SrTiO <sub>3</sub>	1C-a6	74
CaO,Ti	CaTiO <sub>3</sub> -BaTiO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f2	87
	CaTiO <sub>3</sub> -BaTiO <sub>3</sub> -SrTiO <sub>3</sub>	1C-f1	87
CaO <sub>3</sub> Ti	(Ca-Ba)(Ti-Zr)O <sub>3</sub>	1C-f15	88
CaO <sub>3</sub> Ti		1C-a12	76
CaO <sub>3</sub> Zr	CaZrO <sub>3</sub> -BaZrO <sub>3</sub>	1C-a22	76
CaO <sub>3</sub> Zr	CaZrO <sub>3</sub> -CaTiO <sub>3</sub>	1C-b5	82
CaO <sub>3</sub> Zr	CaZrO <sub>3</sub> -PbTiO <sub>3</sub>	1C-a13	76
CaO <sub>3</sub> Zr	CaZrO <sub>3</sub> -PbZrO <sub>3</sub>	1C-a15	88
CaO <sub>3</sub> Zr	(Ca-Ba)(Zr-Ti)O <sub>3</sub>		86
CdNb <sub>2</sub> O <sub>6</sub>	CdNb <sub>2</sub> O <sub>6</sub> -NaNbO <sub>3</sub>	1C-e4	
CdNb <sub>2</sub> O <sub>6</sub>	CdNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-10	101
Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Ca <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	6B-1	106
Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Cd <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub>	6B-3	106
	$Cd_2Nb_2O_7-Mg_2Nb_2O_7$	6B-4	106
Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Pb <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	6B-2	106
Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	$Cd_2Nb_2O_7-Cd_2Nb_2O_7$ $Cd_2Ta_2O_7-Cd_2Nb_2O_7$	6B-3	106
$Cd_2O_7Ta_2$		1C-e7	86
CdO <sub>3</sub> Ti	CdTiO <sub>3</sub> -LiNbO <sub>3</sub>	1C-e7	86
CdO <sub>3</sub> Ti	CdTiO <sub>3</sub> -LiTaO <sub>3</sub>	1C-d8	85
Ce <sub>1/2</sub> Li <sub>1/2</sub> O <sub>3</sub> Ti	(Li <sub>1/2</sub> Ce <sub>1/2</sub> )TiO <sub>3</sub> -PbTiO <sub>3</sub>		87
CoLaO <sub>3</sub>	LaCoO <sub>3</sub> -PbTiO <sub>3</sub> -LaMnO <sub>3</sub>	1C-f11	
Co <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	Co <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -BaTiO <sub>3</sub>	1C-e11	87
Co <sub>2</sub> O <sub>7</sub> Ta <sub>2</sub>	Co <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub> -BaTiO <sub>3</sub>	1C-e11	87
CrLaO <sub>3</sub>	LaCrO <sub>3</sub> -BiFeO <sub>3</sub>	1C-b12	83
CrLaO <sub>3</sub>	LaCrO <sub>3</sub> -PbTiO <sub>3</sub> -LaMnO <sub>3</sub>	1C-f11	87
CrLaO <sub>3</sub> CsNO <sub>3</sub>	CsNO <sub>3</sub> -RbNO <sub>3</sub>	12B-4	134
		35.5	201
Eu <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	(Eu-Gd) <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub>	35-5 35-6	201
Eu <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	$(Eu-Tb)_2(MoO_4)_3$	) -0-0	201
1			



Gross formula	Chemical formula	Nr.	Page
FeLaO <sub>3</sub>	LaFeO <sub>3</sub> -BiFeO <sub>3</sub>	1C-a33	82
FeLaO <sub>3</sub>	LaFeO <sub>3</sub> -PbTiO <sub>3</sub>	1C-c12	84
FeLaO <sub>3</sub>	LaFeO <sub>3</sub> -PbTiO <sub>3</sub> -LaMnO <sub>3</sub>	1C-f11	87
FeLaO <sub>3</sub>	LaFeO <sub>3</sub> -PbTiO <sub>3</sub> -PbZrO <sub>3</sub>	1C-f5	87
Fe <sub>1/2</sub> Nb <sub>1/2</sub> O <sub>3</sub> Pb	Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> -BiFeO <sub>3</sub>	1C-d23	85
Fe <sub>1/2</sub> Nb <sub>1/2</sub> O <sub>3</sub> Pb	$Pb(Fe_{1/2}Nb_{1/2})O_3-PbTiO_3-PbZrO_3$	1C-d25	
Fe <sub>1/2</sub> O <sub>3</sub> PbTa <sub>1/2</sub>	Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub> -PbTiO <sub>3</sub>	1	87
Fe <sub>1/2</sub> O <sub>3</sub> PbTa <sub>1/2</sub>	$Pb(Fe_{1/2}Ta_{1/2})O_3 - PbZrO_3$	1C-d11	85
FeO <sub>3</sub> Sr	SrFeO <sub>3</sub> -BiFeO <sub>3</sub>	1C-d15	85
$Fe_{1/2}O_3SrTa_{1/2}$	Sr(Fe1/2Ta1/2)O3-SrTiO3	1C-c16	84
,	01(101/2101/2)03-011103	1C-d1	84
Gd <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	(Gd-Eu) <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub>	35–5	201
Gd <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	(Gd-Nd) <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub>	35-8	202
Gd <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	$(Gd-Tb)_2(MoO_4)_3$	35–9	202
Gd <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	$(Gd-Y)_2(MoO_4)_3$	35–7	202
Gd <sub>2</sub> Mo <sub>3</sub> O <sub>12</sub>	$Gd_2((Mo-W)O_4)_3$	35-10	202
$Gd_2O_{12}W_3$	$Gd_2((W-Mo)O_4)_3$	3510	202
GeTe	GeTe-SnTe	36–3	214
H <sub>2</sub> KO <sub>4</sub> P	KH <sub>2</sub> PO <sub>4</sub> -NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub>	13B-1	148
$H_4N_2O_3$	NH <sub>4</sub> NO <sub>3</sub> -KNO <sub>3</sub>	12B-1	134
H <sub>6</sub> NO <sub>4</sub> P	NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub> -KH <sub>2</sub> PO <sub>4</sub>	13B-1	148
H <sub>6</sub> NO <sub>4</sub> P	NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub> -TiH <sub>2</sub> PO <sub>4</sub>	13B-2	148
H <sub>8</sub> N <sub>2</sub> O <sub>4</sub> S	$(NH_4)_2SO_4-(NH_4)_2BeF_4$	14B-1	154
H <sub>2</sub> O <sub>4</sub> PTi	TiH <sub>2</sub> PO <sub>4</sub> -NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub>	13B-2	
HfO,Pb	PbHfO <sub>3</sub> -BaHfO <sub>3</sub>		148
HíO <sub>3</sub> Pb	PbHfO <sub>3</sub> -CaHfO <sub>3</sub>	1C-a18	76
HfO <sub>3</sub> Pb	$PbHfO_3-Pb(Sc_{1/2}Nb_{1/2})O_3$	1C-a16	76
HfO <sub>3</sub> Pb	PbHfO <sub>3</sub> -PbTiO <sub>3</sub>	1C-d18	85
HfO,Pb	PbHfO <sub>3</sub> -PbZrO <sub>3</sub>	1C-a29	82
HfO <sub>3</sub> Pb	DPRIO C-11(O	1C-a31	82
HfO <sub>3</sub> Pb	PbHfO <sub>3</sub> -SrHfO <sub>3</sub>	1C-a17	76
	PbHfO <sub>3</sub> -PbTiO <sub>3</sub> -PbO:SnO <sub>2</sub>	1C-f4	87
HfO <sub>3</sub> Sr	SrHfO <sub>3</sub> -PbHfO <sub>3</sub>	1C-a17	76
IK	KI-KNO <sub>3</sub>	12B-3	134
IOSb	SbOI-SbSI	10B-2	127
ISSb	SbSI-AsSI	10B-1	127
ISSb	SbSI-BiSI	10B-5	128
ISSb	SbSI-SbOI	10B-2	127
ISSb	SbSI-SbSBr	10B-3	127
ISSb	SbSI-SbSeI	10B-4	128
ISbSe	SbSeI-SbSI	10B-4	128
InLaO <sub>3</sub>	LaInO <sub>3</sub> -BaTiO <sub>3</sub> -LaYO <sub>3</sub> -SrTiO <sub>3</sub>	1C-f12	88
KNO			
KNO <sub>3</sub>	KNO <sub>3</sub> -KI	12B-3	134
KNO <sub>3</sub>	KNO <sub>3</sub> -NH <sub>4</sub> NO <sub>3</sub>	12B-1	134
KNO,	KNO <sub>3</sub> -RbNO <sub>3</sub>	12B-2	134
KNbO <sub>3</sub>	KNbO <sub>3</sub> -BaTiO <sub>3</sub>	1C-c5	83
KNbO <sub>3</sub>	KNbO <sub>3</sub> -KTaO <sub>3</sub>	1C-a4	74
KNbO <sub>3</sub>	KNbO <sub>3</sub> -NaNbO <sub>3</sub>	1C-a1	73
KNbO <sub>3</sub>	KNbO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-11	101
KNbO <sub>3</sub>	KNbO <sub>3</sub> -PbTiO <sub>3</sub>	1C-c6	83
KNbO <sub>3</sub>	KNbO <sub>3</sub> -SrNb <sub>2</sub> O <sub>6</sub>	5C-b6	103
KNbO <sub>3</sub>	(K-Na)(Nb-Ta)O <sub>3</sub>	1C-f14	88
KNbO <sub>3</sub>	K <sub>0.6</sub> Li <sub>0.4</sub> (Nb <sub>0.3</sub> Ta <sub>0.7</sub> )O <sub>3</sub>	5C-k2	105
KNbO <sub>3</sub>	K(Nb <sub>0.65</sub> Ta <sub>0.35</sub> )O <sub>3</sub> (KTN)	1C-a5	74
KO <sub>3</sub> Sb	KSbO <sub>3</sub> -NaNbO <sub>3</sub>	1C-b2	82
KO <sub>3</sub> Ta	KTaO <sub>3</sub> -KNbO <sub>3</sub>	1C-02 1C-a4	74
KO <sub>s</sub> Ta	KTaO <sub>3</sub> -NaNbO <sub>3</sub>	1C-24 1C-b1	82
		10-01	04
	K(TaNb\O. (KTN)		
KO <sub>3</sub> Ta	$K(Ta_{0.35}Nb_{0.65})O_{3}$ (KTN)	1C-a5	74
KO <sub>3</sub> Ta KO <sub>3</sub> Ta	K(Ta <sub>0.35</sub> Nb <sub>0.65</sub> )O <sub>3</sub> (KTN) (K-Na)(Ta <sub>0.7</sub> Nb <sub>0.3</sub> )O <sub>3</sub>	1C-a5 1C-f14	74 88
KO <sub>3</sub> Ta	$K(Ta_{0.35}Nb_{0.65})O_{3}$ (KTN)	1C-a5	74

Page 

Gross formula	Chemical formula		Nr.	Pa
$LaFeO_3$ $La_{1/2}Li_{1/2}O_3Ti$	LaFeO <sub>3</sub> -PbTiO <sub>3</sub>		1C-c12	
La <sub>1/2</sub> Ll <sub>1/2</sub> U <sub>3</sub> ll	$(\text{Li}_{1/2}\text{La}_{1/2})\text{TiO}_{8}\text{-PbTiO}_{3}$			8
LaMnO <sub>3</sub>	LaMnO <sub>3</sub> -PbTiO <sub>3</sub>		1C-d6	8
LaMnO <sub>3</sub>	LaMnO <sub>3</sub> -LaCoO <sub>3</sub> -PbTiO <sub>3</sub>		1C-c11	8
LaMnO <sub>3</sub>	LaMnO <sub>3</sub> -LaCrO <sub>3</sub> -PbTiO <sub>3</sub>		1C-f11	8
LaMnO <sub>s</sub>	LaMnO <sub>3</sub> -LaFeO <sub>3</sub> -PbTiO <sub>3</sub>		1C-f11	8
LaMnO <sub>3</sub>	LaMnO LaNio Diano		1C-f11	8
LaMnO <sub>3</sub>	LaMnO <sub>3</sub> -LaNiO <sub>3</sub> -PbTiO <sub>3</sub>		1C-f11	8.
La <sub>1/2</sub> Na <sub>1/2</sub> O <sub>3</sub> Ti	LaMnO <sub>3</sub> -PbTiO <sub>3</sub> -SrTiO <sub>3</sub>		1C-f10	
La <sub>2</sub> Nb <sub>6</sub> O <sub>18</sub>	(Na <sub>1/2</sub> La <sub>1/2</sub> )TiO <sub>3</sub> -PbTiO <sub>3</sub>		1C-d7	8.
LaNiO <sub>3</sub>	$La_2O_3 \cdot 3Nb_2O_5 - PbNb_2O_6$		5B-12	8.
	LaNiO <sub>3</sub> -LaMnO <sub>4</sub> -PbTiO <sub>5</sub>			10
LaO,Y	LaYO3-BaTiO3-LaInO3-SrTiO3		1C-f11	8
LiNbO <sub>3</sub>	LiNbO <sub>3</sub> -CdTiO <sub>3</sub>		1C-f12	88
LiNbO <sub>3</sub>	LiNbO <sub>3</sub> -LiTaO <sub>3</sub>	i	1C-e7	86
LiNbO <sub>3</sub>	LiNbO <sub>3</sub> -NaNbO <sub>3</sub>	ĺ	3B-1	94
LiNbO <sub>3</sub>	Lindo Dian o	j	1C-e1	86
LiNbO <sub>3</sub>	LiNbO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>		5B-11	
Li Nd O T:	Li <sub>0.4</sub> K <sub>0.6</sub> (Nb <sub>0.3</sub> Ta <sub>0.7</sub> )O <sub>3</sub>	1	5C-k2	101
Li <sub>1/2</sub> Nd <sub>1/2</sub> O <sub>3</sub> Ti	$(L_{1/2}Nd_{1/2})TiO_3-PbTiO_4$			105
LiO <sub>3</sub> Ta	LiTaO <sub>3</sub> -CdTiO <sub>3</sub>	j	1C-d9	85
LiO <sub>3</sub> Ta	LiTaO <sub>3</sub> -LiNbO <sub>3</sub>	ł	1C-e7	86
LiO <sub>3</sub> Ta	Li <sub>0.4</sub> K <sub>0.6</sub> (Ta <sub>0.7</sub> Nb <sub>0.3</sub> )O <sub>3</sub>		3B-1	94
-	2-0.4110.6(1 a <sub>0.7</sub> 1(0 <sub>0.3</sub> )O <sub>3</sub>	1	5C-k2	105
$Mg_2Nb_2O_7$	Ma Nh O Clay o	1		100
Mg <sub>1/3</sub> Nb <sub>2/3</sub> O <sub>3</sub> Pb	Mg <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>		6B-4	106
Mg <sub>1/3</sub> Nb <sub>2/3</sub> O <sub>3</sub> Pb	Pb(Mg <sub>1/3</sub> Nb <sub>2/3</sub> )O <sub>3</sub> -Pb(Mg <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub>	1	1C-d19	1
Ma O DIXI	$\int \Gamma^{0}(Mg_{1/3}MD_{\bullet/\bullet})U_{\bullet}-PbTiO_{\bullet}-Pb.7\bulletO$		1C-f7	85
$Mg_{1/2}O_3PbW_{1/2}$	$\int PD(Mg_{1/2}W_{1/2})O_0 - PD(Mg_{1/2}Wh_{1/2})O_0$			87
$\mathrm{Mg_{1/2}O_3PbW_{1/2}}$	Pb(Mg <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub> -PbTiO <sub>3</sub>	1	1C-d19	85
$Mn_{1/2}Nb_{1/2}O_3Pb$	Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> -PbTiO <sub>3</sub>		1C-d10	85
$Mn_{2/3}O_3Sn_{1/3}Sr$	Sr(Sn <sub>1/3</sub> Mn <sub>2/3</sub> )O <sub>3</sub> -BiFeO <sub>3</sub>	ľ	1Cd13	85
Mn <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	Mn Nb O D-T:O	1	1C-d22	85
Mn <sub>2</sub> O,Ta <sub>2</sub>	Mn <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -BaTiO <sub>3</sub>		1C-e11	87
Mo <sub>3</sub> Nd <sub>2</sub> O <sub>12</sub>	Mn <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub> -BaTiO <sub>3</sub>		1C-e11	87
Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub>	(Nd-Gd) <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub>		35–8	
Mo <sub>3</sub> O <sub>12</sub> TD <sub>2</sub>	(Tb-Eu) <sub>2</sub> (MoO <sub>4</sub> ) <sub>3</sub>	1	35–6	202
Mo <sub>3</sub> O <sub>12</sub> Tb <sub>2</sub>	$(Tb-Gd)_{\circ}(M_{O}O_{\bullet})_{\circ}$	.		201
$Mo_3O_{12}Y_2$	$(Y-Gd)_2(MoO_4)_3$		35-9 35-7	202
NO DI		- 1	35–7	202
NO <sub>3</sub> Rb	RbNO <sub>3</sub> -CsNO <sub>3</sub>	1	405 4	
NO <sub>3</sub> Rb	RbNO <sub>3</sub> KNO <sub>3</sub>	1	12B-4	134
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -BaTiO <sub>3</sub>	ł	12B-2	134
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -CaNb <sub>2</sub> O <sub>6</sub>	İ	1C-c2	83
NaNbO <sub>3</sub>	NaNhO C-TiO		1C-e3	86
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -CaTiO <sub>3</sub>	i	1C-c1	83
NaNbO,	NaNbO <sub>3</sub> -CdNb <sub>2</sub> O <sub>6</sub>		1C-e4	86
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -KNbO <sub>3</sub>		1C-a1	
	NaNbO,-KSbO,	1		73
NaNbO <sub>3</sub>	$NaNbO_3-KTaO_4$	1	1C-b2	82
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -LiNbO <sub>3</sub>	l	1C-b1	82
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -NaVO <sub>3</sub>	]	1C-e1	86
NaNbO.	NaNbO <sub>3</sub> -NaSbO <sub>3</sub>		1C-e2	86
NaNbO,	NaNho NaTao	1 '	1C-a3	74
NaNbO.	NaNbO <sub>3</sub> -NaTaO <sub>3</sub>	1	1C-a2	74
3	NaNbO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>		1C-e6,	
Mantho				86
NaNbO <sub>s</sub>	NaNbO <sub>3</sub> -PbTiO <sub>3</sub>	j	5B-11	101
NaNbO <sub>3</sub>	NaNbO <sub>2</sub> -PbZrO.		1C-c3	83
NaNbO <sub>3</sub>	NaNbO <sub>3</sub> -SrNb <sub>2</sub> O <sub>6</sub>		1C-c4	83
NaNbO <sub>3</sub>	(Na-K)(Nb-Ta)O <sub>3</sub>		1C-e5	86
NaO.Sb	NaSbO <sub>3</sub> -NaNbO <sub>3</sub>		1C-f14	88
NaO,Ta	NoToO NENTLO	- 1	1C-a3	74
NaO, Ta	NaTaO <sub>3</sub> -NaNbO <sub>3</sub>	1	1C-a2	74
VaO <sub>3</sub> V	(Na-K)(Ta-Nb)O <sub>3</sub>		1C-f14	
Nh Ni A	NaVO <sub>3</sub> -NaNbO <sub>3</sub>	[		88
Nb <sub>2</sub> Ni <sub>2</sub> O <sub>7</sub>	Ni <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -BaTiO <sub>2</sub>		1C-e2	86
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -BaNb <sub>2</sub> O <sub>6</sub>	1	1C-e11	87
$Nb_2O_6Pb$	PbNb <sub>2</sub> O <sub>6</sub> -Bi <sub>2</sub> O <sub>3</sub> · 3Nb <sub>2</sub> O <sub>5</sub>		5B~5	100
$Nb_2O_6Pb$	PhNh O = Bi O = 27:0		5B-13	102
$^{\mathrm{Nb_{8}O_{6}Pb}}$	PbNb <sub>2</sub> O <sub>6</sub> -Bi <sub>2</sub> O <sub>3</sub> ·3TiO <sub>2</sub> PbNb <sub>2</sub> O <sub>6</sub> -CaNb <sub>2</sub> O <sub>6</sub>		5B-14	102
- • -	I TOMO O CAND ()	ı		
<b></b>	2 0 1 2 2 6	ł	5B-2	99

## V Substanzenverzeichnis

	V Substanzenversor	Nr.	Page
Gross formula	Chemical formula	5B-10	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -CdNb <sub>2</sub> O <sub>6</sub>	5B-11	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -KNbO <sub>3</sub>	5B-12	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -La <sub>2</sub> O <sub>3</sub> ·3Nb <sub>2</sub> O <sub>5</sub>	5B-11	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -LiNbO <sub>3</sub>	1C-e6,	86
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -NaNbO <sub>3</sub>	5B-11	101
1(5206-	THE OF THE OFFICE	5B-9	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -PbO:SnO <sub>2</sub>	5B-6	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -PbTa <sub>2</sub> O <sub>6</sub>	5B-7	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -PbTiO <sub>3</sub>	5B-8,	101 87
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -PbZrO <sub>3</sub>	1C-e12	, ,
22.0	DINI O PhNhO	5B-11	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -RbNbO <sub>3</sub> PbNb <sub>2</sub> O <sub>5</sub> -Sm <sub>2</sub> O <sub>3</sub> ·3Nb <sub>2</sub> O <sub>5</sub>	5B-12	100
Nb <sub>2</sub> O <sub>6</sub> Pb	PDND <sub>2</sub> U <sub>6</sub> -Sin <sub>2</sub> U <sub>3</sub> Sin <sub>2</sub> U <sub>5</sub>	5B-4	100
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -SrNb <sub>2</sub> O <sub>6</sub>	5B-12	101
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -Y <sub>2</sub> O <sub>3</sub> · 3Nb <sub>2</sub> O <sub>5</sub>	5B-14	88
Nb <sub>2</sub> O <sub>6</sub> Pb	PbNb <sub>2</sub> O <sub>6</sub> -Bi(Nb-Ti)O <sub>6</sub> PbNb <sub>2</sub> O <sub>6</sub> -BaNb <sub>2</sub> O <sub>6</sub> -BaTiO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f19	
Nb <sub>2</sub> O <sub>6</sub> Pb	PhNb <sub>2</sub> O <sub>6</sub> -Danb <sub>2</sub>	5B-15	102
Nb <sub>2</sub> O <sub>6</sub> Pb	(Pb-Ba-Ca)(Nb-Ta) <sub>2</sub> O <sub>6</sub>	5B-15	102
Nb <sub>2</sub> O <sub>6</sub> Pb	(Pb-Ba-Sr)(Nb-Ta) <sub>2</sub> O <sub>6</sub>	6B-2	106 85
$Nb_2O_7Pb_2$	Pb <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Cd <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub>	1C-d18	
$Nb_{1/2}O_3PbSc_{1/2}$	Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> -PbHfO <sub>3</sub>	1C-d12	85 85
$Nb_{1/2}O_3PbSc_{1/2}$	Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> -PbTiO <sub>3</sub>	1C-d14	
$Nb_{1/2}O_3PbSc_{1/2}$	Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> O <sub>3</sub> -PbZrO <sub>3</sub>	5B-11	101
NbO <sub>3</sub> Rb	RbNbO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-12	101.
Nb <sub>6</sub> O <sub>18</sub> Sm <sub>2</sub>	Sm <sub>2</sub> O <sub>3</sub> · 3Nb <sub>2</sub> O <sub>5</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-3	99
Nb <sub>2</sub> O <sub>6</sub> Sr	SrNb <sub>2</sub> O <sub>6</sub> -BaNb <sub>2</sub> O <sub>6</sub>	5C-b6	103
Nb <sub>2</sub> O <sub>6</sub> Sr	SrNb <sub>2</sub> O <sub>6</sub> -KNbO <sub>3</sub>	1C-e5	86
Nb <sub>2</sub> O <sub>6</sub> Sr	SrNb <sub>2</sub> O <sub>6</sub> -NaNbO <sub>3</sub>	5B-4	100
Nb <sub>2</sub> O <sub>6</sub> Sr	SrNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-15	102
Nb <sub>2</sub> O <sub>6</sub> Sr	(Sr-Ba-Pb)(Nb-Ta) <sub>2</sub> O <sub>6</sub>	6B-5	106
Nb <sub>2</sub> O <sub>7</sub> Sr <sub>2</sub>	Sr <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> -Sr <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub>	1C-e11	87
Ni <sub>2</sub> O <sub>7</sub> Ta <sub>2</sub>	Ni <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub> -BaTiO <sub>3</sub>	5B-12	101
$Nb_2O_{18}Y_2$	Y <sub>2</sub> O <sub>3</sub> ·3Nb <sub>2</sub> O <sub>5</sub> -PbNb <sub>2</sub> O <sub>6</sub>	1C-a21	76
	PbO: SnO <sub>2</sub> -BaSnO <sub>3</sub>	1C-b4	82
O <sub>8</sub> PbSn	PbO: SnO <sub>2</sub> -BaTiO <sub>3</sub>	5B-9	101
O <sub>3</sub> PbSn	PbO: SnO <sub>2</sub> -PbNb <sub>2</sub> O <sub>3</sub>	1C-a30	82
O <sub>3</sub> PbSn	PbO: SnO <sub>2</sub> -PbTiO <sub>3</sub>	1C-a32	82
O <sub>3</sub> PbSn	PhO · SnO ~ PbZrO.	1C-f4	87
O <sub>3</sub> PbSn	PbO·SnO <sub>2</sub> -PbHfO <sub>3</sub> -PbHiO <sub>3</sub>	1C-f3	87
$O_3PbSn$	PbO: SnO <sub>3</sub> -PbTiO <sub>3</sub> -PbZrO <sub>3</sub>	1C-f18	88
O <sub>s</sub> PbSn	(Pb-Ba)(Sn-Ti)O <sub>3</sub>	5B-6	101
O <sub>3</sub> PbSn	PhTa <sub>2</sub> O <sub>4</sub> -PbNb <sub>2</sub> O <sub>6</sub>	1C-e13	87
O <sub>6</sub> PbTa <sub>2</sub>	PbTa <sub>o</sub> O <sub>s</sub> -PbZrO <sub>3</sub>	5B-16	102
O <sub>6</sub> PbTa <sub>2</sub>	$PhTa_{\bullet}O_{\bullet}-SrTa_{\bullet}U_{6}$	5B-15	102
O <sub>6</sub> PbTa <sub>2</sub>	(Ph_Ba_Ca)(Ta−Nb) <sub>2</sub> U <sub>6</sub>	5B-15	102
$O_6PbTa_2$	(Pb-Ba-Sr)(Ta-Nb) <sub>2</sub> O <sub>6</sub>	1C-b10	83
O <sub>6</sub> PbTa <sub>2</sub>	PhTiO,-BaSnO,	1C-a11	
O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -BaTiO <sub>3</sub>	1C-b9	82
O <sub>3</sub> PbTi	PhTiOBaZrO.	1C-c13	84
O <sub>3</sub> PbTi	PbTiO,-BiFeO <sub>3</sub>	1C-b6	82
O <sub>3</sub> PbTi	PbTiO,-CaSnO3	1C-a8	75
O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -CaTiO <sub>3</sub>	1C-b5	82
O <sub>3</sub> PbTi	PhTiO,-CaZrO <sub>3</sub>	1C-d5	84
O PhTi	$PbTiO_{3}-(K_{1/2}Bi_{1/2})TiO_{3}$	1C-c6	83
O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -KNbO <sub>3</sub>	1C-c1	)   84
O <sub>3</sub> PbTi	PhTiO,-LaAlO,	1C-c1	2   84
O <sub>3</sub> PbTi	PhTiOLaFeO.	1C-c1	1   84
O <sub>3</sub> PbTi	PhTiOLaMnO <sub>3</sub>	1C-d8	85
O <sub>3</sub> PbTi	PhTiO <sub>2</sub> -(Li <sub>1/2</sub> Ce <sub>1/2</sub> )11O <sub>3</sub>	1C-d6	84
O <sub>3</sub> PbTi	PhTiO <sub>2</sub> -(Li <sub>1/2</sub> La <sub>1/2</sub> ) 11U <sub>3</sub>	1C-d9	85
O,PbTi	PhTiO <sub>2</sub> -(Li <sub>1/2</sub> Nd <sub>1/2</sub> ) 11U <sub>3</sub>	1C-d4	,   84
O <sub>3</sub> PbTi	PhTiO <sub>2</sub> -(Na <sub>1/2</sub> Bi <sub>1/2</sub> ) 11O <sub>3</sub>	1C-d7	1 05
O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -(Na <sub>1/2</sub> La <sub>1/2</sub> )TiO <sub>3</sub>		
O <sub>3</sub> PbTi			

	Γ	Gross formula	Chemical formula		<del></del>
Page	[-			Nr.	Page
101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -NaNbO <sub>3</sub>	1C-c3	83
101		O <sub>3</sub> PbTi	$PbTiO_3 - Pb(Fe_{1/2}Ta_{1/2})O_3$	1C-d11	85
101		O₃PbTi O₃PbTi	PbTiO <sub>3</sub> -PbHfO <sub>3</sub>	1C-a29	82
101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -Pb(Mg <sub>1/2</sub> W <sub>1/2</sub> )O <sub>3</sub>	1C-d10	85
86		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -Pb(Mn <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1C-d13	85
101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub> PbTiO <sub>3</sub> -PbO: SnO <sub>2</sub>	5B-7	101
101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub>	1C-a30	82
101 101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -PbZrO <sub>3</sub>	1C-d12	85
101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -SrSnO <sub>3</sub>	1C-a27 1C-b8	77
87	<u> </u>	O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -SrTiO <sub>3</sub>	1C-08 1C-a10	82
101		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -SrZrO <sub>3</sub>	1C-a10 1C-b7	75 82
101	1.3	O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -ABO <sub>3</sub> -PbZrO <sub>3</sub>	1C-f9	87
100		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -BaTiO <sub>3</sub> -CaTiO <sub>3</sub>	1C-f2	87
101		O₃PbTi O₃PbTi	PbTiO <sub>3</sub> -BiFeO <sub>3</sub> -PbZrO <sub>3</sub>	1C-f6	87
102		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -LaCoO <sub>3</sub> -LaMnO <sub>3</sub>	1C-f11	87
88		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -LaCrO <sub>3</sub> -LaMnO <sub>3</sub>	1C-f11	87
102	1 8	$O_3$ PbTi	PbTiO <sub>3</sub> -LaFeO <sub>3</sub> -LaMnO <sub>3</sub> PbTiO <sub>3</sub> -LaFeO <sub>3</sub> -PbZrO <sub>3</sub>	1C-f11	87
102		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -LaMnO <sub>3</sub> -LaNiO <sub>3</sub>	1C-f5	87
106 85		O <sub>3</sub> PbTi	PbTiO <sub>3</sub> -LaMnO <sub>3</sub> -SrTiO <sub>3</sub>	1C-f11	87
85	(	O <sub>s</sub> PbTi	$PbTiO_{s}-Pb(Fe_{1/s}Nb_{1/s})O_{s}-Pb7rO$	1C-f10	87
85		O <sub>3</sub> PbTi	$PDI1O_{s}-PbHiO_{s}-PbO:SnO_{s}$	1C-f8 1C-f4	87
101		O <sub>3</sub> PbTi	$PbTiO_3-Pb(Mg_{1/2}Nb_{0/2})O_2-PbZrO_1$	1C-14 1C-17	87 87
101		O₃PbTi	PDIO <sub>3</sub> -PbO: SnO <sub>2</sub> -PbZrO <sub>2</sub>	1C-f3	87
99	15	O <sub>s</sub> PbTi	PbTiO <sub>3</sub> -BaTiO <sub>3</sub> -BaNb <sub>2</sub> O <sub>6</sub> -PbNb <sub>2</sub> O <sub>6</sub>	1C-f19	88
103		O <sub>3</sub> PbTi	(Pb-Ba)(Ti-Sn)O,	1C-f18	88
86		O₃PbTi O₃PbTi	(Pb-Ba)(Ti-Zr)O <sub>3</sub>	1C-f17	88
100		O <sub>3</sub> PbTi	Pb(Ti-Zr)O <sub>3</sub>	1C-a28	78
102		O <sub>3</sub> PbZr	(Pb-Sr)(Ti-Zr)O <sub>3</sub> PbZrO <sub>3</sub> -BaTiO <sub>3</sub>	1C-f16	88
106 87		O <sub>s</sub> PbZr	PbZrO <sub>3</sub> -BaZrO <sub>3</sub>	1C-b3	82
101		O <sub>3</sub> PbZr	PbZrO <sub>3</sub> -BiFeO <sub>3</sub>	1C-a15	76
101	(	O <sub>3</sub> PbZr	PbZrO <sub>3</sub> -CaZrO <sub>3</sub>	1C-c14	84
76	) (	O <sub>3</sub> PbZr	$PbZrO_3-(K_{1/2}Bi_{1/2})ZrO_2$	1C-a13 1C-d17	76
82		PbZr	$PbZrO_{3}-(Na_{1/2}Bi_{1/2})TiO_{3}$	1C-d21	85 85
101		O <sub>3</sub> PbZr	$PbZrO_3 - (Na_{1/2}Bi_{1/2})ZrO_2$	1C-d16	85
82		)₃PbZr	PbZrO <sub>3</sub> -NaNbO <sub>3</sub>	1C-c4	83
82		)₃PbZr )₃PbZr	PbZrO <sub>3</sub> -Pb(Fe <sub>1/2</sub> Ta <sub>1/2</sub> )O <sub>3</sub>	1C-d15	85
87		O <sub>3</sub> PbZr	PbZrO <sub>3</sub> -PbHfO <sub>3</sub>	1C-a31	82
87 88			PbZrO <sub>3</sub> -PbNb <sub>2</sub> O <sub>6</sub>	5B-8,	101
101	C	0₃PbZr	PbZrO <sub>3</sub> -PbO: SnO <sub>2</sub>	1C-e12	87
87		)₃PbZr	$PbZrO_3-Pb(Sc_{1/2}Nb_{1/2})O_3$	1C-a32	82
102		)₃PbZr	PbZrO <sub>3</sub> -PbTa <sub>2</sub> O <sub>6</sub>	1C-d14 1C-e13	85
102		PbZr	PbZrO <sub>3</sub> -PbTiO <sub>3</sub>	1C-a27	87 77
102		O <sub>3</sub> PbZr O <sub>3</sub> PbZr	PbZrO <sub>3</sub> -SrZrO <sub>3</sub>	1C-a14	76
83		$p_{s}$ $p_{b}$ $p_{c}$	Pb(Zr-Ti)O <sub>3</sub> (PZT)	1C-a28	78
75		O <sub>s</sub> PbZr	PbZrO <sub>3</sub> -ABO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f9	87
82		PbZr	PbZrO <sub>3</sub> -BiFeO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f6	87
84	lo	PbZr	PbZrO <sub>3</sub> -LaFeO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f5	87
82 75		PbZr	PbZrO <sub>3</sub> -Pb(Fe <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> -PbTiO <sub>3</sub> PbZrO <sub>3</sub> -Pb(Mg <sub>1/3</sub> Nb <sub>2/3</sub> )O <sub>3</sub> -PbTiO <sub>3</sub>	1C-f8	87
82		9₃PbZr	PbZrO <sub>3</sub> -PbO: SnO <sub>2</sub> -PbTiO <sub>3</sub>	1C-f7	87
84		<sub>3</sub> PbZr	(Pb-Ba)(Zr-Ti)O <sub>3</sub>	1C-f3	87
83	Ιŏ	PbZr	(Pb-Sr)(Zr-Ti)O <sub>3</sub>	1C-f17 1C-f16	88
84	Ιŏ	SnSr S-S	SrSnO <sub>3</sub> -BaSnO <sub>3</sub>	1C-116 1C-a20	88 76
84		3SnSr	SrSnO <sub>3</sub> -BiFeO <sub>3</sub>	1C-c15	84
84		SnSr SnSr	SrSnO <sub>3</sub> -CaSnO <sub>3</sub>	1C-a19	76
85		3SnSr	SrSnO <sub>3</sub> -PbTiO <sub>3</sub>	1C-b8	82
84	0	SrTa,	SrSnO <sub>3</sub> -BaSnO <sub>3</sub> -CaSnO <sub>3</sub>	1C-f13	88
85	0	SrTa,	SrTa <sub>2</sub> O <sub>6</sub> -PbTa <sub>2</sub> O <sub>6</sub> (Sr-Ba-Pb)(Ta-Nb) <sub>2</sub> O <sub>6</sub>	5B-16	102
84 85	0	Sr <sub>2</sub> Ta <sub>2</sub>	$Sr_2Ta_2O_7-Ca_2Ta_2O_7$	5B-15	102
05	L	<u> </u>	2-207 04214207	6B-6	106
.1			Furnhata/Makita		

## V Substanzenverzeichnis

Gross formula	Chemical formula	Nr.	T
O <sub>7</sub> Sr <sub>2</sub> Ta <sub>2</sub> O <sub>8</sub> SrTi	Sr <sub>2</sub> Ta <sub>2</sub> O <sub>7</sub> -Sr <sub>2</sub> Nb <sub>2</sub> O <sub>7</sub> SrTiO <sub>3</sub> -BaTiO <sub>3</sub>	6B-5	Page
O <sub>3</sub> SrTi	SrTiO <sub>3</sub> -BiFeO <sub>3</sub>	1C-a9	75
O <sub>3</sub> SrTi	SrTiO <sub>3</sub> -Bi <sub>2</sub> O <sub>3</sub> · 3TiO <sub>2</sub>	1C-c7	83
O <sub>3</sub> SrTi	SrTiO <sub>3</sub> -CaTiO <sub>3</sub>	1C-e8	86
O <sub>3</sub> SrTi	SrTiO <sub>3</sub> -PbTiO <sub>3</sub>	1C-a6	74
O <sub>3</sub> SrTi	$SrTiO_3-Sr(Fe_{1/2}Ta_{1/2})O_3$	1C-a10	75
O <sub>3</sub> SrTi	$SrTiO_3-BaTiO_3-CaTiO_3$	1C-d1	84
O <sub>3</sub> SrTi	SrTiO <sub>3</sub> -LaMnO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f1	87
O <sub>3</sub> SrTi	SrTiO <sub>3</sub> -BaTiO <sub>3</sub> -LaInO <sub>3</sub> -LaYO <sub>3</sub>	1C-f10	87
O <sub>s</sub> SrTi	(Sr-Pb)(Ti-Zr)O <sub>3</sub>	1C-f12	88
O <sub>s</sub> SrZr	SrZrO <sub>3</sub> -PbTiO <sub>3</sub>	1C-f16	88
O <sub>s</sub> SrZr	SrZrO <sub>3</sub> -PbZrO <sub>3</sub>	1C-b7	82
O <sub>s</sub> SrZr	(Sr-Pb)(Zr-Ti)O <sub>3</sub>	1C-a14	
PZT	n ku	IC-f16	76 88
nTe	Pb(Zr-Ti)O <sub>3</sub>	1C-a28	78
	SnTe-GeTe	36–3	214

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